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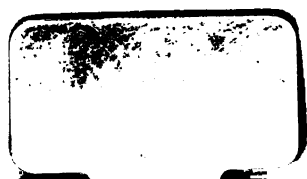
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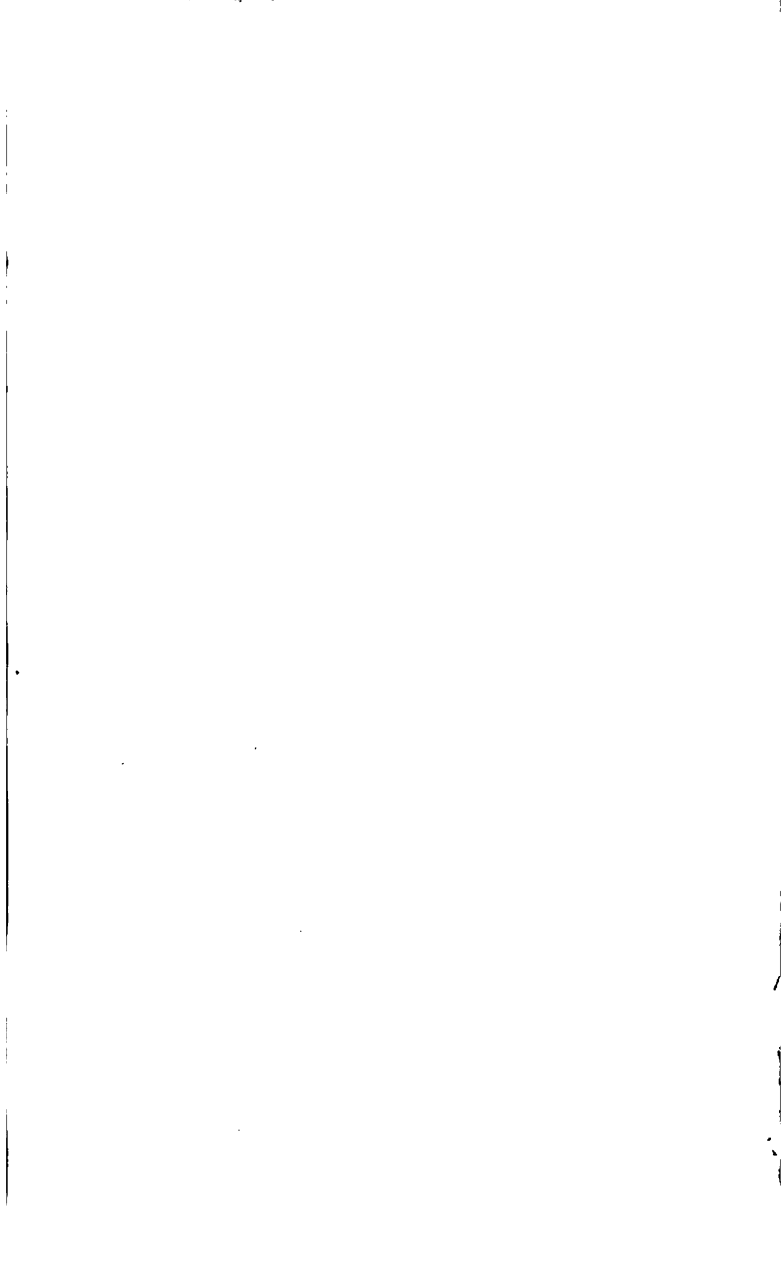


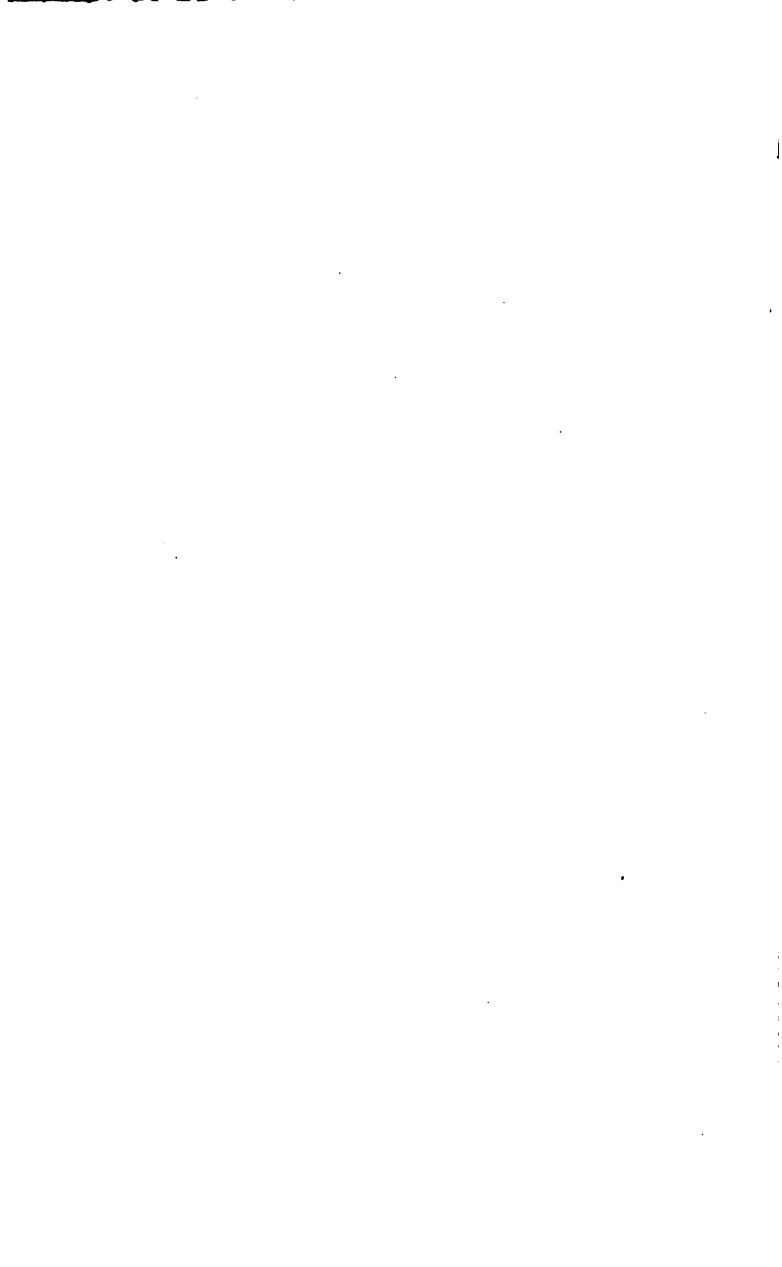




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BOTANY FOR LADIES;

OR,

A POPULAR INTRODUCTION

TO THE

Natural System of Plants,

ACCORDING TO THE CLASSIFICATION OF DE CANDOLLE.

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BY

[*Jane Webb*]

MRS. LOUDON,

Author of "Instructions in Gardening for Ladies," "Year-Book of
Natural History," &c. &c.

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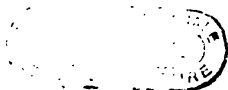
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PREFACE.

WHEN I was a child, I never could learn Botany. There was something in the Linnean system (the only one then taught) excessively repugnant to me; I never could remember the different classes and orders, and after several attempts the study was given up as one too difficult for me to master. When I married, however, I soon found the necessity of knowing something of Botany, as well as of Gardening. I always accompanied my husband in his visits to different gardens; and when we saw beautiful flowers, I was continually asking the names, though alas! these names, when I heard them, conveyed no ideas to my mind, and I was not any wiser than before. Still the natural wish to know something of what we admire, impelled me to repeat my fruitless questions; till at last, vexed at my ignorance, and ashamed of not

being able to answer the appeals which gardeners often made to me in doubtful cases, (supposing that Mr. Loudon's wife must know everything about plants,) I determined to learn Botany if possible; and as my old repugnance remained to the Linnean system, I resolved to study the Natural one. Accordingly I began; but when I heard that plants were divided into the two great classes, the Vasculares and the Cellulares, and again into the Dicotyledons or Exogens, the Monocotyledons or Endogens, and the Acotyledons or Acrogens, and that the Dicotyledons were redivided into the Dichlamydeæ and Monochlamydeæ, and again into three sub-classes, Thalamifloræ, Calycifloræ, and Corollifloræ, I was in despair, for I thought it quite impossible that I ever could remember all the hard names that seemed to stand on the very threshold of the science, as if to forbid the entrance of any but the initiated.

Some time afterwards, as I was walking through the gardens of the Horticultural Society at Chiswick, my attention was attracted by a mass of the beautiful crimson flowers of

Malope grandiflora. I had never seen the plant before, and I eagerly asked the name. "It is some Malvaceous plant," answered Mr. Loudon, carelessly; and immediately afterwards he left me to look at some trees which he was about to have drawn for his *Arboretum Britannicum*. "Some Malvaceous plant," thought I, as I continued looking at the splendid bed before me; and then I remembered how much the form of these beautiful flowers resembled that of the flowers of the crimson Mallow, the botanical name of which I recollected was *Malva*. "I wish I could find out some other Malvaceous plant," I thought to myself; and when we soon afterwards walked through the hothouses, I continued to ask if the Chinese Hibiscus, which I saw in flower there, did not belong to Malvaceæ. I was answered in the affirmative; and I was so pleased with my newly-acquired knowledge, that I was not satisfied till I had discovered every Malvaceous plant that was in flower in the garden. I next learned to know the Cruciferous and Umbelliferous plants; and thus I acquired a general knowledge of three extensive

orders with very little trouble to myself. My attention was more fairly aroused, and by learning one order after another, I soon attained a sufficient knowledge of Botany to answer all the purposes for which I wished to learn it, without recurring to the hard words which had so much alarmed me at the outset. One great obstacle to my advancement was the difficulty I had in understanding botanical works. With the exception of Dr. Lindley's *Ladies' Botany*, they were all sealed books to me; and even that did not tell half I wanted to know, though it contained a great deal I could not understand. It is so difficult for men whose knowledge has grown with their growth, and strengthened with their strength, to imagine the state of profound ignorance in which a beginner is, that even their elementary books are like the old *Eton Grammar* when it was written in Latin—they require a master to explain them. It is the want that I have felt that has induced me to write the following pages; in which I have endeavoured to meet the wants of those whomaybenow in the same difficulties that I was in myself.

The course I pursued is also that which I shall point out to my readers. I shall first endeavour to explain to them as clearly as I can the botanical characteristics of the orders which contain plants commonly grown in British gardens ; and at the end of my work I shall lay before them a slight outline of all the orders scientifically arranged, which they may study or not as they like. Most ladies will, however, probably be satisfied with knowing the orders containing popular plants ; and these, I am confident, they will never repent having studied. Indeed, I do not think that I could form a kinder wish for them, than to hope that they may find as much pleasure in the pursuit as I have derived from it myself. Whenever I go into any country I have formerly visited, I feel as though I were endowed with a new sense. Even the very banks by the sides of the roads, which I before thought dull and uninteresting, now appear fraught with beauty. A new charm seems thrown over the face of nature, and a degree of interest is given to even the commonest weeds. I have often heard that know-

ledge is power, and I am quite sure that it contributes greatly to enjoyment. A man knowing nothing of natural history, and of course not caring for anything relating to it, may travel from one extremity of a country to the other, without finding anything to interest, or even amuse him ; but the man of science, and particularly the Botanist, cannot walk a dozen yards along a beaten turnpike-road without finding something to excite his attention. A wild plant in a hedge, a tuft of moss on a wall, and even the Lichens which discolour the stones, all present objects of interest, and of admiration for that Almighty Power whose care has provided the flower to shelter the infant germ, and has laid up a stock of nourishment in the seed to supply the first wants of the tender plant. It has been often said that the study of nature has a tendency to elevate and ameliorate the mind ; and there is perhaps no branch of Natural History which more fully illustrates the truth of this remark than Botany.

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MODERN BOTANY FOR LADIES.

PART I.

INTRODUCTION.

THE following pages are intended to enable my readers to acquire a knowledge of Botany with as little trouble to themselves as possible.

As, however, Botany is a "wide word," I must here premise that I only propose to treat of that part of the science which relates to the classification of plants, according to the natural system of Jussieu, as improved by the late Professor De Candolle ; and that the grand object I have in view is to enable my readers to find out the name of a plant when they see it for the first time ; or, if they hear or read the name of a plant, to make that name intelligible to them. Nothing is more natural than to ask the name of every pretty flower we see ; but unless the inquirer knows something of botany, the name, if it be a scientific one, will seem only a collection

of barbarous sounds, and will convey no ideas to the mind. Half the interest of new greenhouse plants is thus destroyed, as few of them have English names, and strangers will soon cease to make any inquiries respecting them when they find they can obtain no answers that they can understand. Now, a very slight knowledge of botany will take away this mortifying feeling ; and the name of a new plant, and the ascertaining the order to which it belongs, will recall a variety of recollections that will open up a new source of interest and enjoyment even in such interesting and enjoyable things as flowers—for we never can enjoy thoroughly anything that we do not understand.

It now only remains for me to say why I have divided my work into two parts. My reason is my belief that a student will always remember more easily a few strongly marked divisions than a number of smaller ones, the differences between which are only faintly perceptible. In a more advanced state of knowledge, it is delightful to trace the minute shades of difference by which the numerous orders are united, so as to form one great whole ; but these gentle gradations confuse a beginner. On this account I have thought it best to devote the first part of my work to a few of the more important orders, which differ most widely from each other, and

which I have described at a greater length than my space will allow me to bestow upon the whole; and in the second part of my work, I shall give a short account of the whole natural system, introducing the orders described in the first part, in their proper places, so that my readers may see how they are connected with the others.

MISCELLANEOUS ORDERS.

PRELIMINARY OBSERVATIONS.

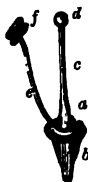
In this first part I shall endeavour to familiarise my readers with botanical details, as all the orders I shall describe contain a great number of genera; and to begin at the beginning, I must first tell them what is here meant by an order, and what by a genus of plants. A genus then may be compared to a family of children, all the plants in it being known by one common or generic name, in addition to their particular or specific one. Thus, if *Rosa alba* be spoken of, *Rosa* is the generic name which is common to all roses, but *alba* is the specific name which is only applied to the white rose.

An order includes many genera, and bears the same affinity to a nation as a genus does to

a family. In many cases the resemblance which the plants in each order bear to each other is sufficiently strong to enable the student to recognise them at first sight; in the same manner as you may generally know a Frenchman or a German from an Englishman, even before you hear him speak. But unfortunately this general outward resemblance does not always exist, and it is necessary for the student to become acquainted with the general construction of flowers before the points of resemblance which have occasioned certain genera to be linked together to form orders, can be understood.

It is thus evident that the first step towards a knowledge of systematic botany is to study flowers thoroughly, and few objects of study can be more interesting, whether we regard the elegance of their forms or the beauty and brilliancy of their colours. My readers may perhaps, however, be as much surprised as I was, to learn that the beautifully coloured parts of flowers are the least important; and that, as they only serve as a covering to the stamens and pistil, which are designed for the production of seed, they may be, and indeed actually are, wanting in a great many of what are considered perfect flowers. In examining a flower, therefore, it must be remembered that the production of seed is the object, for which all the curi-

ous contrivances we discover are designed. The germen or ovary (*a* in fig. 1) is protected by a thick fleshy substance (*b*), called the receptacle or disk, which serves as a bed or foundation on which the other parts of the flower rest, and which is thence frequently called a thalamus or torus, both words signifying a bed. The ovary itself is hollow, and it is sometimes divided into several cells, each enclosing a number of ovules, which are afterwards to become seeds; but sometimes there is only one cell, and sometimes only one seed in each cell.



The ovary is juicy and succulent when young, and very different from

FIG. 1.—STAMEN
AND PISTIL.

what it afterwards becomes when the seeds are ripe. Rising from the ovary in most flowers, is a long and slender stalk called the style (*c*), which supports a kind of head, called the stigma (*d*). The ovary, the style, and the stigma, constitute what is called the pistil; but the style is not so essential as the other parts, and indeed it is wanting in many flowers. Sometimes there are many styles, each with a stigma at its summit, forming the pistil; and when this is the case, the ovary will have as many cells as there are stigmas, or each stigma will have a separate ovary to itself. There are generally several stamens in a flower,

each perfect stamen consisting of three parts,—the Filament, the Anther, and the Pollen. The filament (*e*) is, however, often wanting, and it is only the anther (*f*), and the powder called the pollen which it contains, that are essential. The anther, when the flower first expands, appears like a little oblong case with a deep groove down the centre, or rather like two oblong cases stuck together. When these cases become ripe, they burst and let out the pollen which was inclosed within them. The pollen is generally very abundant, and it is often seen in the form of yellow dust descending from the catkins of the cedar of Lebanon, or the Scotch fir, or of orange powder, as on the stamens of the orange lily, when it sticks to everything it touches. About the time of the bursting of the anthers, the stigma becomes covered with a glutinous moisture, which absorbs the pollen that falls upon it. The pollen, when absorbed by the stigma, is conveyed down the style to the ovary, where it falls upon and fertilises the ovules or incipient seeds. Nothing can be more beautiful or more ingenious than the mechanism by which this process is effected. It is necessary that the grains of pollen should be separated before they reach the ovary, and they are so in their passage down the style in a manner more fine and delicate than could be done by any exertion of

mere human skill. We know that we ourselves are “fearfully and wonderfully made,” but how few of us are aware that every flower we crush beneath our feet, or gather only to destroy, displays as much of the Divine care and wisdom in its construction, as the frame of the mightiest giant!

I have already mentioned that the most conspicuous part of the flower is merely a covering to protect the seed-producing organs from injury. In most flowers there are two of these coverings, which form together what is called the perianth; the inner one, when spoken of separately, being called the corolla, and the outer one the calyx. The corolla is generally of some brilliant colour, and in most cases it is



FIG. 2.—COROLLA OF A FLOWER.



FIG. 3.—CALYX OF A FLOWER.

divided into several leaf-like parts called petals, (see *g* in figs. 2 and 3); and the calyx, which is commonly green, is divided into similar portions called sepals (see *h*). Sometimes there is

only one of these coverings, and when this is the case it is called by modern botanists the calyx, though it may be coloured like a corolla; and sometimes the calyx and corolla are of the same colour, and so mixed as hardly to be distinguished from each other, as in the crocus and the tulip; in which case the divisions are called the segments of the perianth.

CHAPTER I.

THE ORDER RANUNCULACEÆ : ILLUSTRATED BY THE RANUNCULUS,
THE BUTTERCUP OR CROWFOOT, THE PEONY, THE ANEMONE,
THE HEPATICA, THE CLEMATIS, THE CHRISTMAS ROSE, THE
WINTER ACONITE, MONKSHOOD, THE LARKSPUR, AND THE
COLUMBINE.

SUCH of my readers who may have formed their first ideas of the natural system from some order, the flowers of which bear a strong resemblance to each other, will be surprised at reading the names of the heterogeneous assemblage of plants at the head of this chapter; for surely no flowers can bear less resemblance to each other than the buttercup and the peony do to the columbine and the larkspur. There are, however, striking points of resemblance which link these flowers together; the principal of which are the number and disposition of the ovaries, or carpels as they are called in this case, which, though they grow close together, and sometimes even adhere to each other, are yet perfectly distinct; in the number and position of the stamens, which grow out of the receptacle from beneath the carpels; and in the leaves and

young stems, when cut or pressed, yielding a thin yellowish juice, which is extremely acrid, and, in most cases, poisonous. The flowers of the plants belonging to Ranunculaceæ differ widely in their shapes; and all the incongruities that are only sparingly met with in other orders, are here gathered together. Some of the flowers have only a coloured calyx, as in the clematis; in others the calyx and corolla are of the same colour, as in the globe-flower, or so intermingled as to seem all one, as in the columbine; and in others the calyx forms the most ornamental part of the flower, as in monkshood and the larkspurs. In short, modern botanists seem to have placed this unfortunate order first, as though to terrify students on the very threshold of the science, and to prevent them from daring to advance any farther to penetrate into its mysteries.

THE GENUS RANUNCULUS.

THE word *Ranunculus* will doubtless conjure up in the minds of my readers those very showy, double, brilliantly-coloured flowers, which flower in spring, and are generally grown in beds like tulips. These flowers form a species of the genus, under the name of *Ranunculus asiaticus*; and having been introduced from Asia, they have retained their botanic name from not

having any English one. The honour of giving a name to the genus does not, however, rest on them, but belongs to a common English weed.

Every one who has travelled through England in the months of June and July, must have remarked the almost innumerable buttercups which glitter among the long grass of the meadows at that season; and those who observe closely, will have noticed that these brilliant little flowers are never found in poor soil, or in hilly situations, but in rich valleys where the grass is rank and luxuriant from abundance of moisture. It is this circumstance that has obtained for the buttercup the botanical name of *Ranunculus*, the word being derived from *Rana*, a frog, a creature that delights in moist places.

The buttercup being the type of the genus *Ranunculus*, and the order *Ranunculaceæ*, a close examination of its flowers will show the peculiarities which distinguish both the genus and the order. The characteristics of the order, as far as regards the number and position of the carpels and stamens, are shown in the section of the flower in the lower part of *fig. 4*; and those of the genus are, a green calyx of five sepals, and a bright coloured corolla of five petals (see *a* in *fig. 4*); numerous stamens, the anthers of which are adnate, that is, with the filament growing up the back (see *b*); and numerous carpels (*c*)

affixed to the upper part of the receptacle, which is drawn up in the shape of a cone to receive them. The flower shown in *fig. 4*, and the detached petal (*e*), given separately to show the little scale at its base, are of the natural size ; but the anther *b* is magnified to show the curious manner in which it is affixed, for its whole length, to the filament. The section of the flower is also magnified to show the elevated receptacle, and the

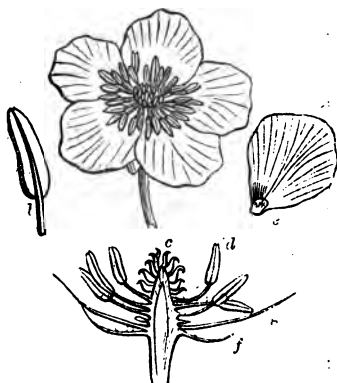


FIG. 4.—THE FLOWER OF THE COMMON BUTTERCUP.

position of the carpels *c* and the stamens *d* with regard to each other. The line *g* shows the position of the corolla, and *f* that of the calyx, while the short line between the corolla and the stamens indicates the scale, which, from its being supposed to serve as a receptacle for honey, is sometimes called the nectary. The carpels, it will be observed, each consists of a broad part swollen in the centre, which is the ovary, with a curved part or beak at one end, terminating in a sharp point, which is the stigma. Each

ovary contains only one ovule, and when the seed ripens, the carpel does not open to discharge it, but drops with the seed. When the flower is fully expanded, the green carpels may be seen in the centre, surrounded by the stamens, as shown at *h* in *fig. 5* ; but after the petals drop,



FIG. 5.—FLOWER AND RIPE CARPELS OF THE BUTTERCUP.

the stamens also disappear, and the carpels increase in size, till they assume the appearance shown at *i*, which shows the kind of head formed by the carpels on the receptacle after the flower has faded.

The plant from which my drawings were made was a common buttercup, *Ranunculus acris*, which my readers will easily recognise if they should meet with it, by its erect flower-stem, deeply cut leaves, and fibrous root. Another species (*Ranunculus bulbosus*) is, also, sometimes called the buttercup; but it is easily distinguished by its bulbous root. Both these, and several other species, have deeply cut leaves,

which somewhat resemble the feet of a bird, and hence the name of crowfoot is often applied to them. Others, such as the greater spearwort (*Ranunculus lingua*), have long tongue-shaped leaves. In all, the footstalks of the leaves are somewhat folded round the stem at their base.

Such of my readers as reside in the country will find it very amusing to gather all the kinds of crowfoot, buttercup, goldilocks, and spearwort, they can find in the fields and lanes; and after having compared the flowers with the description I have given, to try to find out the specific names, by comparing the other particulars with the descriptions in Hooker's or Lindley's British Botany, or with the plates and descriptions in the new edition of Sowerby's English Botany. In a short time they will not want these aids, but will be able to name the plants at once, and to tell in what they differ from each other by memory. I shall never forget the pleasure I once had in finding out the name of a plant myself. I happened to be waiting for Mr. Loudon, (who had gone to examine some new pines and firs,) in the pleasure-grounds of a villa, just opposite a small pond, which was covered by some white flowers that I did not know. The flowers were small, but very beautiful, and as they shone with almost a metallic lustre in the sun, they looked like a silvery

mantle thrown over the water. I was curious to know what they were, and having got one with some difficulty, and by the help of my parasol, I began to examine it botanically. The leaves at first told me nothing as to the genus, for the upper ones were nearly round, and only slightly cut into three lobes, while the lower ones were almost as much divided as fennel; but on examining them closely, I found their stalks sheathed the stem at the base. This gave me the first idea of the plant being a *Ranunculus*, for I remembered the leaves of that genus were stem-clasping. I then looked at the plant again, and wondered at my own stupidity in not having before observed its resemblance to the genus. There was the cup-shaped flower-of five petals, the green calyx of five sepals, the numerous stamens and carpels, the elevated receptacle, and even the fine texture and glossy surface of the petals. Nothing was different but the colour; and yet it was the want of the bright golden yellow of the common buttercup, that prevented me from even thinking of that genus, when pondering on the name of my water-plant. I should add, that I would not ask any help from Mr. Loudon, but identified my plant myself on my return home; when, by comparing it with the description in Hooker's *British Flora*, which happened to be the first botanical work I had

at hand, I found it was *Ranunculus aquatilis*, the water crowfoot.

In a similar manner my readers may amuse themselves, by identifying the plants they meet with, and they will be surprised to find how easy the task will soon become. I must warn them, however, that they will not find double flowers quite so easy to recognise as single ones. In double flowers the stamens and carpels are entirely or partially changed into petals; as may be seen in the florists' varieties of *Ranunculus*, in the yellow bachelor's buttons, which is a variety of the common buttercup, and in the Fair Maid of France, which is a variety of *Ranunculus platanifolius*, a species found wild on the mountains of Germany.

THE GENUS FICARIA.

Pansies, lilies, kingcups, daisies,
Let them live upon their praises ;
Long as there's a sun that sets,
 Primroses will have their glory ;
Long as there are violets,
 They will have a place in story.
There's a flower that shall be mine,
'Tis the little Celandine.
Ill befall the yellow flowers,
Children of the flaring hours,
Buttercups that will be seen,
 Whether we will see or no ;
Others, too, of lofty mien,
 They have done as worldlings do,
Stolen praise that should be thine,
Little humble Celandine.

IN these verses, and several others in the same strain, Wordsworth sings the praises of the pretty little British plant called pilewort, or the lesser celandine. This plant botanists formerly included in the genus *Ranunculus*, but De Candolle, finding that instead of having five sepals and five petals like all the kinds of *Ranunculus*, it has three sepals, and nine petals, which are narrow and pointed, instead of being broad and somewhat rounded, made it into a new genus under the name of *Ficaria ranunculoides*—its old name having been *Ranunculus Ficaria*. Its flowers are of a bright yellow, like those of the buttercup, and of the same delicate texture and glossy surface; but they are distinguished, not only as I have just observed, by having nine narrow pointed petals, and only three sepals, but by the leaves, which are roundish and shining, and not stem-clasping. These peculiarities are so striking, that I knew the *Ficaria* the first time I saw it in a growing state, merely from having read a description of it. Even when not in flower it may be known, by its roundish smooth leaves, and by the petioles or footstalks of its leaves being the same throughout; whereas those of all the kinds of *Ranunculus* are dilated at the base, to enable them to enfold the stem.

THE GENUS PÆONIA.

THE flowers of the Peony bear considerable resemblance to those of the buttercup, but every part is on an enlarged scale ; and there are some important differences—one of which is, that the Peony retains its calyx till the seeds are ripe, while in all the kinds of *Ranunculus* the calyx

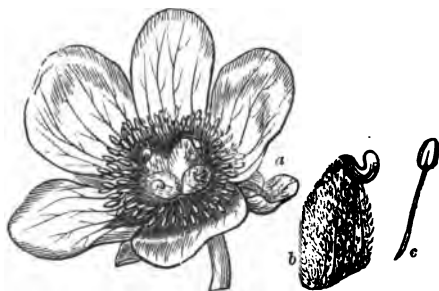


FIG. 6.—FLOWER OF THE MALE PEONY, WITH DETACHED CARPEL AND STAMEN.

drops with the corolla. The carpels of the Peony are also many-seeded, while those of the *Ranunculus* contain only one seed in each. In the male Peony (*P. corallina*) there are five petals and five sepals, (see *a* in *fig. 6*.) with numerous stamens, forming a ring round four large woolly carpels in the centre of the flower. The stamens (*c*) are adnate, like those of the *Ranunculus* ; and the carpels (*b*) are each terminated by a thick, fleshy, hooked stigma. These

carpels open naturally on the side when ripe, to discharge their seeds. The herbaceous Peonies with double flowers, now so common in our gardens, have generally only two carpels, each containing about twenty seeds, arranged in two rows; and the Chinese tree Peony (*P. Moutan*) has from five to ten carpels, with only a few seeds in each. This last species is distinguished by the receptacle being drawn out into a thin membrane-like substance, which rises between the carpels like the remains of withered leaves, and partially covers them.

THE GENUS ANEMONE.

I HAVE already mentioned (p. 10) that some of the genera included in the order Ranunculaceæ have only a coloured calyx and no corolla; and the Anemone is an example of this peculiarity of construction. The pasque-flower (*Anemone pulsatilla*) is divided into six dark purple sepals, which are covered on the outside with long silky hairs. The leaves are so much cut as almost to resemble those of parsley; and at a short distance below the flowers there are three small floral leaves, or bracts, which grow round the stem, and form what is called an involucre. The carpels are small, oblong bodies, pressed close together, and each is furnished with a long, feathery point, called an awn. The

carpels, though lying so close together, are perfectly distinct, and part readily at the slightest touch; and each contains only one seed.

It will be seen from this hasty sketch, that the principal point of resemblance between the genera *Anemone* and *Ranunculus*, in a botanical point of view, lies in the carpels, which are close together, and are yet so distinct as to part at the slightest touch. There is, however, a general resemblance in some of the flowers, from their five sepals, and numerous stamens, that renders it difficult for a beginner to distinguish an *Anemone* from a *Ranunculus*. In many of the British species, also, the carpels are not awned, but slightly curved, very like those of a buttercup. I remember being once very much puzzled with a beautiful little bright yellow flower, that I found in a wood. At first I thought it was a *Ranunculus*, but the petals were pointed and not roundish; and it could not be a *Ficaria*, because it had only five petals. At last I looked to see what kind of calyx it had, and found none, that is, no green calyx; and then, observing the involucre of three leaves growing in a whorl round the stem, at some distance below the flower, I knew it was an *Anemone*; and on comparing it with the plates in Sowerby's English Botany, on my return home, I ascertained that it was *Anemone ranunculoides*.

My readers will therefore observe that Anemones may be always known by their involucre, and by their having only one covering (a showy, coloured calyx) to the flower. The number of sepals in this calyx varies in the different species. The pasque-flower has six; the white wood Anemone generally five; and the Blue Mountain Anemone from twelve to twenty. The involucre also sometimes grows a long way from the flower, as in this last-mentioned species; and sometimes so close to it, as in the Garland, or Poppy Anemone (*A. coronaria*), as to look almost like a green calyx to the flower. The awns, or feathery tails, are also not found attached to the carpels of all the species; and this distinction is considered so important, that some botanists make those plants which have awned carpels into a separate genus, which they call *Pulsatilla*, and of which the pasque-flower is considered the type. This genus, however, has not, I believe, been generally adopted.

I have now only a few words to say on florists' Anemones, the tuberous roots of which most of my readers must have seen in the seed-shops. Most of these are varieties of the Garland Anemone, already mentioned as having its involucre close to the flower. The sepals of this species are roundish, six in number, and when the flower is in a single state, there are a great

number of stamens, bearing dark purple anthers in the centre of the flower. When the flower becomes double, the sepals, which retain their form and number, only becoming somewhat more spread out and flattened, are called by florists the guard-leaves; and the stamens in the centre are metamorphosed into petals, which generally retain their dark purple colour, or at any rate are much darker than the sepals. The other florists' Anemones spring from *A. stellata*, or *hortensis*, and they are distinguished by having pointed sepals, and a white spot at the base of each, so as to form a white circle inside the cup of the flower. The involucre is a long way from the calyx, and when the flowers become double, the sepals can scarcely be distinguished from the metamorphosed stamens.

The hepatica or liverwort, the varieties of which look so pretty in our gardens in spring, was formerly considered to be a species of Anemone, and indeed the genus *Hepatica* appears to rest on very slight grounds. It has, however, been adopted by most modern botanists, and the *Anemone Hepatica* of Linnæus is now generally called *Hepatica triloba*. The normal form of the species is the single blue; and the double blue, the single and double pink, and the single and double white, are all only varieties of this. The hepatica agrees in all points with the

Anemone, except in the involucre, which is so very like a green calyx, from the manner in which it enfolds the flower in the bud, as scarcely to be distinguished. I could not, indeed, be persuaded that this calyx-like covering was an involucre, till I turned back the apparent sepals, and found that their glossy surface was within : I also found that there was a very small portion of the stem between them and the flower, a circumstance which always distinguishes an involucre from a calyx, the latter forming part of the flower, and being always in some manner attached to the receptacle.

THE GENUS CLEMATIS.

THIS genus resembles the Anemone in having only one covering, an ornamental calyx, to its seed-producing organs. It has not, however, any distinct involucre ; though in one species, *C. calycina*, there are two bracts, or floral leaves, which bear some resemblance to one. The flowers of the different species vary considerably in form, colour, and the number of the sepals ; *C. calycina* and *C. viticella* having four, *C. florida* six, *C. vitalba* five, &c. All the species agree, however, in the seeds, which are produced singly, each in a separate awned carpel, which does not open, but drops with the seed, and is sown with it. These carpels, which are common

to the genera *Ranunculus*, *Anemone*, *Adonis*, and many other kinds of *Ranunculaceæ*, are called caryopsides, and seeds thus enclosed are always much longer in coming up than any others. In some species of *Clematis* the awns of the carpels are smooth; but in others they



FIG. 7.—CARPELS OF THE CLEMATIS VITALBA.

are bearded or feathered, as in those of the traveller's joy (*C. vitalba*), shown in *fig. 7*. The leaves of the *Clematis* vary considerably in form and arrangement; but the stems of the climbing species are furnished with tendrils, or slender twining leafless stems, which some botanists suppose to be metamorphosed leaves.

The plants composing the genus *Atragène* have been separated from *Clematis*; because they are said to have petals, which the genus *Clematis* has not. It must not, however, be supposed that the petals of the *Atragène* bear

any resemblance to what is generally understood by that word. On the contrary, the showy part of the Atragenè is still only a coloured calyx ; while the petals are oblong, leaf-like bodies in the centre of the flower, which look like dilated stamens. In other respects the two genera are scarcely to be distinguished from each other.

THE GENUS HELLEBORUS, &c.

THE Christmas rose (*Helleborus niger*) bears considerable resemblance in the construction of its flowers to the Atragenè, for it has a showy calyx, and narrow oblong petals, encircling the stamens in the centre of the flower. The calyx of the Christmas rose is white, delicately tinged with pink, and the petals are green. The carpels are erect and long, swelling out at the base, and each ends in a curved style with a pointed stigma. The Christmas rose takes its specific name of *niger* (black) from the root, which is covered with a thick black skin. The common Hellebore takes its name of *H. viridis*, from its flowers, which are green. The carpels of this plant frequently grow slightly together, and their styles curve inwardly.

The British species of Hellebore have no involucre, and the Christmas rose has only two bracts or floral leaves, which form a calyx-like covering to the bud ; but the little yellow

garden plant, called the Winter Aconite, which was included by Linnæus in the genus *Helleborus*, has a decided involucre, on which the little yellow, cup-shaped flower reposes, like a fairy bowl upon a leafy plate. The conspicuous part of this flower, like the others, is the calyx, which encloses a number of short tubular petals. This little plant is now separated from *Helleborus*, and formed into a distinct genus, under the name of *Eranthus hyemalis*, from its carpels being each furnished with a very short foot-stalk, by which they are attached to the receptacle, instead of growing upon it as in the other genera. The root is tuberous, or rather it forms a kind of underground stem, sending up tufts of leaves and flowers from the different buds. Thus we often see several tufts of the Winter Aconite growing so far from each other as to appear distinct ; but which, in fact, all spring from the same root. The Globe-flower (*Trollius europæus*), which has a golden yellow, globe-shaped calyx, enclosing a number of small oblong petals, is nearly allied to the Winter Aconite ; and the Fennel-flower, or Devil in a Bush (*Nigella damascena*), agrees with the common Hellebore in the adhesion of its carpels.

THE GENUS ACONITUM.

WE are so accustomed to see in our gardens the tall showy perennial called monkshood or



FIG. 8.—FLOWER AND SEED-VESSELS OF THE MONKSHOOD.

wolfsbane (*Aconitum Napellus*), that few persons think of examining the flowers in detail. They well deserve, however, to be examined, as they are very curious in their construction. The showy part of the flower is an ornamental calyx of six sepals, but the upper two of these are

larger than the others, and adhere together so as to form a singular sort of covering, like a monk's cowl or hood. (See *a* in *fig.* 8.) The stamens are numerous, and they encircle three or five oval carpels, with thread-like styles, and pointed stigmas, as shown at *b*; which when ripe burst open at the top (*c*) to discharge the seed, without separating. Carpels of this kind are called follicles. Under the hood, and entirely concealed by it, are the petals (see *fig.* 9),



FIG. 9.—PETALS OF
THE MONKSHOOD.

which form what may certainly be considered the most remarkable part of the flower, as they are so curiously folded up that they look more like gigantic stamens than petals. The older botanists described these petals as nectaries, with crested claws. The leaves are divided into from three to five principal segments, which are again deeply cut into several others. The stem of the common Monkshood is thickened at the base, or collar, where it joins the root, so as to give it somewhat the appearance of celery; and hence ignorant persons have been poisoned by eating it. This knotted appearance of the stem is not common to all the species, and it gives rise to the specific name of *Napellus*, which signifies a little turnip.

THE GENUS DELPHINIUM.

THE plants belonging to the genus *Delphinium*, that is to say, the Larkspurs, have their flowers constructed in nearly as curious a manner as those of the different kinds of Monkshood; but they differ in the sepals and petals both forming



FIG. 10.—THE FLOWERS OF THE BRANCHING LARKSPUR.

conspicuous parts of the flower, though they are generally quite distinct both in form and colour, and may be easily traced through all the different forms they assume in the various species. They are, however, perhaps most easily distin-

guished in the branching or autumnal Larkspur (*Delphinium consolida*). In the flower of this plant the spur (*a* in *fig.* 10) is the upper sepal of the calyx, and it serves as a cover to part of the petals. There are four other portions of the calyx (*b*), which assume the appearance of ordinary sepals. The petals are four in number;

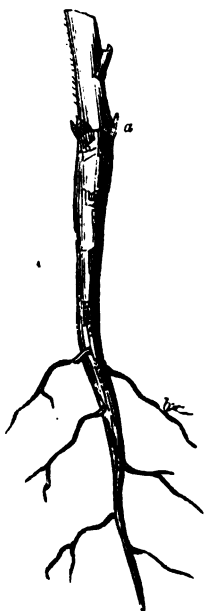


FIG. 11.—TAP ROOT OF THE
BRANCHING LARKSPUR.

and they are united at the lower part, and drawn out into a sort of tail, as shown at *c*; while the upper part of two of them stands up like asses' ears (*d*) in the centre of the flower; and the others are curiously folded, so as to form a hood over the stamens and carpels, as shown at *e*. The anthers of the stamens resemble those of the *Ranunculus*; but the filaments are bent, as shown at *f*. The carpels (*g*) are upright, hairy, and terminate in a blunt, fleshy stigma (*h*).

When ripe, they open in the same manner as those of the Monkshood. The branching Larkspur has a fusiform or

tap root, as shown in *fig.* 11, in which *a* is the

collar, or as the Italians call it *la noda vitale*; and *b* the fibrous roots, through the points of which the plant takes up its food.

The flowers of the other kinds of Larkspur resemble this one in their general appearance, though they differ in the minor details. Those of the Rocket Larkspur (*D. Ajacis*) lose their spurs when they become double; and those of the Bee Larkspurs have their petals nearly black, and instead of standing up like ears, they are so curiously folded as to resemble a bee nestling in the centre of the flower.

THE GENUS *AQUILEGIA*.

THE common Columbine (*Aquilegia vulgaris*) differs from all the flowers I have yet described in having the sepals and petals not only of the same colour, but so intermingled as to be scarcely distinguishable from each other. The flower (given on a reduced scale at *a* in *fig. 12*) is composed of five horn-shaped petals, which are curved at the upper end, and form a kind of coronet round the stem; and five oval sepals, which are placed alternately with them; all, generally speaking, being of the same colour. The horn-shaped petal, or nectary as it was called by Linnæus, is attached to the receptacle at the thickened rim (*b*), while the sepal is attached at the point (*c*); *d* shows the dis-

position of the stamens; *e* a separate stamen, with its adnate anther; *f* the inner row of



FIG. 12.—FLOWER AND LEAF OF THE COLUMBINE.

stamens, which are produced without anthers, and with their filaments growing together, so as to form a thin membranaceous case for the carpels, which are shown exposed at *g*. The carpels, when ripe, become follicles. The leaf of the Columbine is bi-ternate; that is, it is cut into three large divisions, each of which is cut into three smaller ones; so that it is twice-ternate. The petiole or foot-stalk of the leaf sheaths the stem, as shown at *h*, where the leaf is represented on a reduced scale to suit the flower.

I would advise such of my readers as are anxious to turn the preceding pages to account, to procure as many of the plants I have described as possible, and to compare them with each other, and with any other plants belonging to the order Ranunculaceæ that they can obtain. Those who have access to a botanic garden will have no difficulty in finding the names of the genera included in the order; and those who have not this advantage, must consult Don's edition of Sweet's *Hortus Britannicus*, or any other catalogue in which the plants are arranged according to the Natural System. When a number of specimens have been collected, the student will be surprised to see how many points of resemblance exist between them. The stems of all, when cut, will yield a watery juice; which is always acrid, though some of the plants are more poisonous than others. The stamens will be found to be always numerous, and always attached to the receptacle below the carpels; and the anthers are generally adnate, that is attached to the filaments from one end to the other (see p. 12). The carpels are in most cases numerous, and either distinct, or adhering in such a manner as to show plainly the line of junction between them; they are also always one-celled, whether one or many-seeded, and generally either caryopsides (see

p. 24), or follicles (see p. 28). The leaves are generally divided into three or five lobes, each of which is cut into several smaller divisions; and the petioles or leaf-stalks are very frequently dilated at the base, and sheathing the stem. In most cases, the flowers are of brilliant colours, several of them being cup-shaped, and many with the calyx more ornamental than the corolla. The seeds will generally keep good for several years; and several of them, particularly those of the kind called caryopsides, when sown, are often a long time before they come up.

CHAPTER II.

THE ORDER LEGUMINOSÆ: ILLUSTRATED BY THE SWEET-PEA, THE RED CLOVER, ACACIA ARMATA, THE SENSITIVE PLANT, THE BARBADOES FLOWER-FENCE, THE CAROB-TREE, THE TAMARIND, THE SENNA, THE GLEDITSCHIA, THE LOGWOOD, THE JUDAS-TREE, AND THE KENTUCKY COFFEE-TREE.

THIS order is a very numerous one, containing above three hundred genera, and including several highly important plants, both for food and commerce. As examples of the utility of the Leguminosæ for food, I need only mention the pea and bean, and all their numerous allies; and as examples of their importance in medicine and the arts, I may enumerate senna, liquorice, the tamarind, gum-arabic, and logwood. Among the ornamental plants belonging to this order are, the Laburnum, the Furze or Gorse, the Robinia or False Acacia, the true Acacias, the Sensitive Plant, and the Barbadoes Flower-fence. It will be seen by this enumeration, that the flowers of the Leguminosæ differ from each other nearly as much as those of Ranunculacæ; but when in seed, they are all easily recognised by their seed-vessels, which are always legumes, that is, bearing more or less resemblance to the pod of the common pea. To aid the memory

in retaining the great number of genera included in this order, various methods have been devised of re-dividing it ; and of these I shall adopt the newest, which is also the simplest, by which they are arranged in three tribes, according to their flowers.

TRIBE I.—PAPILIONACEOUS FLOWERS.

The flowers of this tribe are called Papilio-

naceous ; because *Papilio* is the scientific name of a genus of butterflies, which they were supposed to resemble. The type of this tribe may be considered the flower of the sweet-pea (*Lathyrus odoratus*), which has a small green calyx, cut into five deep notches, but not divided into regular sepals. (See *a* and *b* in *fig. 13*.)

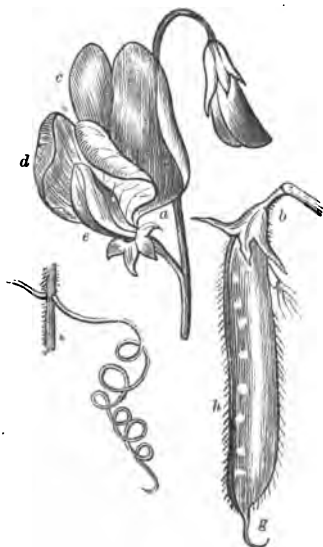


FIG. 13.—FLOWER, POD, AND TENDRIL, OF THE SWEET-PEA.

The corolla is in five petals, the largest of

which (*c*) stands erect, and is called the vexillum or standard; below this are two smaller petals (*d*), which are called the algæ or wings; and below these are two petals, joined together so as to form a kind of boat (*e*), which are called the carina or keel, and which serve as a cradle for the stamens and pistil. There are ten stamens, nine of which have the lower half of their filaments growing together, so as to form a fleshy substance at the base, as shown in *fig. 14* at *f*, and the other (*g*) is free.

The ovary is oblong, terminating in a filiform style, with a pointed stigma, as shown at *g* in *fig. 13*; and it is one-celled and many-seeded; the seeds being what we call the peas. When the petals



FIG. 14.—STAMENS OF THE SWEET-PEA.

fall, the pod still retains the calyx (*b*), and the style (*g*); and these remain on till the seeds are ripe, when the pod divides naturally into two parts, or valves as they are called, which curl back so as to discharge the seeds. If the pod be examined before it bursts, it will be found that the valves are composed of a fleshy substance, lined with a strong membrane or skin, and that they are united by two seams, called the dorsal and ventral sutures. Along the ventral suture (*h*) there runs a kind of nerve, called the placenta, to which the peas

are attached, each pea being furnished with a little separate stalk, called a funicle. A cook would be surprised, even in these enlightened times, to be told to take a legume of *Pisum sativum*, and after separating the two valves at the dorsal suture, to detach the funicles of the seeds from the placenta; yet these scientific terms would merely describe the operation of shelling the peas. It will be seen by this description that the pod of the pea differs very materially from the seed-vessels of all the other plants I have had occasion to describe; and that it thus forms a very distinctive character for the order. The other parts vary in the different genera: the calyx is sometimes tubular, and sometimes inflated; sometimes it has only four notches, or teeth as they are called, instead of five, and sometimes it has five distinct sepals divided to the base. The parts of the corolla vary also in proportion to each other, the keel in some of the Australian plants is as long as the standard; as, for example, in *Kennedia Maryatta*; and in others the wings are so small as to be scarcely visible. The stamens of many of the species are also free, that is, divided to the base; while in others they resemble those of the sweet-pea, in having nine joined together and one free; and in others the whole are joined together at the base. The pods also

vary very much in size and form ; being sometimes nearly round, and only one or two-seeded ; and in others long, and containing many seeds, as in the common bean or pea. The seeds themselves are so different that the tribe has been divided, on account of them, into two sections : the one consisting of those plants which, like the common bean, have the seed dividing into two fleshy seed-leaves or cotyledons, when it begins to germinate ; and the other, the seed-leaves of which are thin. The seeds of the papilionaceous plants which have thin cotyledons are not eatable ; but those with fleshy cotyledons may be safely used as food. The fleshy cotyledons do not always rise above the ground ; but they do so decidedly in the bean and the lupine ; and if either of these seeds be laid in moist soil with the hilum or scar downwards, the seed, as soon as it begins to germinate, will divide into two parts (that is, into two cotyledons), which will rise above the ground, and become green like leaves ; though, from still retaining their roundish form, they are easily distinguished from the true leaves, which rise in the centre. Though my readers will have no difficulty in recognising most of the Leguminosæ which have papilionaceous flowers, there are some genera, respecting which they may be interested to learn a few particulars.

Thus, the *Chorozema* is one of the kinds with thin cotyledons, and consequently its seeds are not eatable. The legumes of this genus are roundish, and swelled out, so as to bear but little outward resemblance to a pod. *Sophora*, *Edwardsia*, *Virgilia*, *Podolobium*; *Callistachys*, *Brachysema*, *Burtonia*, *Dillwynia*, *Eutaxia*, *Pultenæa*, *Daviesia*, and *Mirbelia*, have all thin cotyledons, and their ten stamens all separate from each other; but in *Hovea*, *Platylobium*, and *Bossiaea*, though the cotyledons are thin, the stamens all grow together at the base. I mention these common greenhouse shrubs, that my readers may have an opportunity of examining their botanical construction, and thus verifying their names. The common furze (*Ulex europæus*), the Spanish broom (*Spartium junceum*), the Petty whin (*Genista Anglica*), the Laburnum (*Cytisus Laburnum*), and the common broom, all belong to this division, and consequently their seeds are not eatable; those of the Laburnum are indeed poisonous. The distinctions between *Spartium*, *Genista*, and *Cytisus*, are very slight, lying chiefly in the calyx; and as a proof of this the common broom, which is now called *Cytisus scoparius*, was formerly supposed to be a *Spartium*, and afterwards a *Genista*.

The common red clover (*Trifolium pratense*)

has its flowers in such dense heads that it is difficult at first sight to discover that they are Papilionaceous. On examination, however, it will be found that each separate flower has its standard, wings, and keel, though the wings are so large as to hide the keel, and nearly to obscure the standard. The calyx is tubular at the base, but divided above into five long, awl-shaped teeth, that stand widely apart from each other. The legume has only one or two seeds, and it is so small as generally to be hidden by the calyx.

TRIBE II.—MIMOSÆ.

THE second division of Leguminosæ comprises those plants which have heads of flowers either in spikes or balls, like those shown in *fig. 15*. This figure represents two heads of flowers of *Acacia armata*, a well-known greenhouse shrub, of their natural size; and *fig. 16* shows a head of similar flowers magnified. In the lat-



FIG. 15.—FLOWERS AND SPRIG OF
ACACIA ARMATA.

ter, *a* shows the calyx, which is five-toothed, and *b* the petals, which are five in number and



FIG. 16.—FLOWER
OF ACACIA MAG-
NIFICED.

quite regular in shape; *c* are the stamens, which vary from ten to two hundred in each flower, and which are raised so high above the petals as to give a light and tuft-like appearance to the whole flower.

The legumes are very large in proportion to the flower; and consequently, by a wise provision of nature, only a very few of the flowers produce seed. The valves of the legumes are not fleshy like those of the pea, but dry and hard, and when they open they do not curl back.

The flowers in the different kinds of *Acacia*, differ in the corolla, which has sometimes only four petals, which are occasionally united at the base, and in the calyx, which is sometimes only four-cleft. The flowers also in many species are in spikes instead of balls.

The rest of the plant of *Acacia armata* is very curious; what appear to be the leaves (see *d* in *fig.* 15) are, in fact, only the petioles of the leaves dilated into what are called phyllodia; the true leaves, which were of the kind called bi-pinnate, having fallen off, or never unfolded. The true leaves, however, often appear on seedling plants; and thus, when seeds are sown

of several kinds of *Acacia*, it is sometimes difficult to recognise them till they have attained



FIG. 17.—THE BI-PINNATE LEAF OF AN ACACIA.

a considerable age. The stipules of the leaves, (which are to ordinary leaves what bracts are to flowers,) are in *Acacia armata* converted into spines, as shown at *e*. In some kinds of *Acacia* the true leaves, with the petioles in their natural state, (see *fig. 17*,) are retained in the adult plants, as in *Acacia dealbata*; and in others, the bi-pinnate leaves are occasionally found attached to the phyllodia, as in *A. melanoxylon*. The bi-pinnate leaves are composed of from six to twenty pairs of pinnæ, or compound leaflets (see *f* in *fig. 17*), each of which consists of from eight to forty pairs of small leaflets (*g*). The Gum Arabic tree, *Acacia vera*, has leaves with only two pairs of pinnæ, but each has eight or ten pairs of small leaflets. The branches and spines are red, and the heads of flowers are yellow.

There are above three hundred known species of *Acacia*.

The genus *Mimosa* differs from *Acacia* in the corolla being funnel-shaped, and four or five cleft. There are seldom above fifteen stamens, which are generally on longer filaments than those of the *Acacia*; and the legume is compressed and jointed or articulated between the seeds, so that the part which contains one seed may be broken off, without tearing the rest. The Sensitive-plant (*Mimosa pudica*) is a familiar example of this genus.

The cotyledons of the plants belonging to this tribe are generally leafy; and the seeds are not eatable. The plants themselves are easily recognised by their ball or tassel-shaped heads or spikes of flowers; by the small cup-shape and inconspicuous corolla of each; by the great number and length of the stamens; and by their bi-pinnate leaves, or phyllodia supplying the place of leaves—though the phyllodia are sometimes found in Australian plants with papilionaceous flowers, as, for example, in *Bossia ensata*.

TRIBE III.—CÆSALPINIÆ.

THE flowers of the plants contained in this tribe have generally five regular, widely spreading petals, which are never joined together;

and stamens of unequal length, which with few exceptions are also perfectly free. The petals are generally of the same size and shape; though sometimes, as in the Barbadoes Flower-fence (*Poinciana*, or *Cæsalpinia pulcherrima*), four are of the same shape, and one deformed (see *fig. 18*).



FIG. 18.—FLOWER OF THE BARBADOES FLOWER-FENCE.

The filaments of some of the stamens are very long and curving over, but the others are much shorter and erect; the style is long and slender, ending in a pointed stigma. The legume is flat, and it looks almost many-celled, from the seeds being divided from each other by a kind of spongy substance, frequently found in the pods.

of plants belonging to this division. The leaves are bi-pinnate, and the stem is spiny.

The Carob-tree, or St. John's bread (*Ceratonia siliqua*), agrees with the Barbadoes Flower-fence in the pulpy matter dividing the seeds, though it differs widely in its flowers, which are without petals, and do not possess any beauty. The pulp of the pods of the Carob tree is eatable; but that of Poinciana is said to be injurious. The pod of the Tamarind (*Tamarindus indica*) differs from the preceding species in having the pulpy matter of its pods contained between the outer and inner skin of each valve, like the fleshy substance in the pod of the pea, instead of serving as a bed for the seeds. The flowers of the tamarind have five equal petals of a brownish yellow, three of them being streaked with pink; and the anthers are nearly rose-colour. The stamens and the style both curve upwards. It is the pods prepared with sugar that form what we call Tamarinds. In *Cassia lanceolata*, the leaves of which furnish senna, the flowers have a bright yellow corolla of five concave petals, three of which are somewhat larger than the others. The stamens are also unequal in length; and the style curves upwards. The legume is kidney-shaped, and the cells are divided from each other by thin membranous partitions. The *Gleditschia* or Honey Locusts,

now so frequently planted in our shrubberies on account of the lightness and elegance of their foliage, belong to this division, and some of them, particularly the Chinese Thorny Acacia (*Gleditschia horrida*), are remarkable for their thorns proceeding from the trunk and large branches, as well as from the axils of the leaves. The Logwood (*Hæmatoxylon Campechianum*), has inconspicuous yellow flowers, the petals being very little longer than the calyx ; and the legume has seldom more than two seeds. Though it is considered a tree, the stem is seldom thicker than the arm of a man, and it is generally crooked ; chips of the wood are used for dyeing purple. The Judas-tree (*Cercis siliquastrum*) is another species belonging to this division, as, though the flowers appear of the papilionaceous kind, they are, in fact, composed of five petals, nearly equal in size, but having the wings the largest. There are ten stamens, free, and of unequal length. The legume is oblong and many-seeded ; and it opens only on the dorsal suture, the other side to which the seeds are attached being slightly winged. The flowers are each on a separate flower-stalk or pedicel, but they rise from the trunk and branches in tufts or fascicles. The leaves are simple and cordate ; and they do not appear till the flowers have faded.

The Kentucky Coffee-tree (*Gymnocladus canadensis*) is the last plant belonging to this division that I shall attempt to describe. This tree is called in Canada, Chicot, or the stump-tree, from its having no visible buds, and thus appearing like a dead stump in winter. The flowers of this plant are white, and they are produced in racemes, but they bear no resemblance to the pea flowers, having rather a star-like appearance, like those of the Jasmine (see *fig. 19*).



FIG. 19.—FLOWERS OF THE KENTUCKY COFFEE-TREE.

The calyx (*a*) is tubular; and the upper part or limb is divided into five parts (*b*), which alternate with the petals of the corolla (*c*). There are ten stamens, but they are completely

enclosed in the tube of the calyx. The pod is very large, the valves becoming hard and bony when dry; and the seeds are like large beans, the pod being deeply indented between the seeds. The leaves are bi-pinnate, with from four to seven pairs of pinnæ; the lower having only one small leaflet, but the rest bearing from six to eight pairs of leaflets each. This tree must not be confounded with the true Coffee-tree, which belongs to Rubiaceæ, and from which it is

perfectly distinct in every respect; and it only takes its American name from its beans having been used as a substitute for coffee. The outer bark of this tree, when it becomes old, splits off in narrow strips and rolls up; and its timber, like that of the Robinia or False Acacia, having very little sap wood, is thus very strong in quite young trees, though it is of little value when the tree is full-grown.

The species contained in the first and second divisions of this order will be easily recognised by botanical students; and though those of the third division are much more difficult to find out, still there is a kind of family likeness, particularly in the leaves, which will enable the eye, with a little practice, to recognise them. The student should visit the hothouses of botanic gardens and nurseries, and should there endeavour to pick out plants belonging to this order.

CHAPTER III.

THE ORDER ROSACEÆ, ILLUSTRATED BY DIFFERENT KINDS OF
ROSES; THE POTENTILLA; THE STRAWBERRY; THE RASPBERRY;
SPIRÆA; KERRIA OR CORCHORUS JAPONICA; THE ALMOND;
THE PEACH AND NECTARINE; THE APRICOT; THE PLUM;
THE CHERRY; THE APPLE; THE PEAR; THE MOUNTAIN ASH;
THE WHITE BEAM TREE; QUINCE; PYRUS OR CYDONIA JAPONICA;
THE HAWTHORN; THE INDIAN HAWTHORN; THE
MEDLAR; PHOTINIA; ERIOBOTRYA; COTONEASTER; AMELANCHIER;
BURNET; AND ALCHEMILLA OR LADIES'-MANTLE.

ALL the numerous plants which compose this large order agree more or less with the rose in the construction of their flowers, though they differ widely in the appearance of their fruit. They all agree in having the receptacle dilated, so as to form a lining to the lower part of the calyx, and in the upper part of this lining the stamens and petals are inserted above the ovary; and the anthers are innate, that is, the filament is inserted only in the lower part. The leaves also have generally large and conspicuous stipules; and they are frequently compound, that is, composed of several pairs of leaflets, placed exactly opposite to each other; though the leaves themselves are never opposite to each other, but are placed alternately on the main stem. These

characters are common to the order; but the plants included in it differ from each other so much in other respects, that it has been found necessary to redivide Rosaceæ into tribes, of which the following six contain plants common in British gardens.

TRIBE I.—ROSEÆ.

THE flowers of the wild Rose have the lower part of the calyx tubular and fleshy (from being lined with the dilated receptacle) and the upper part divided into five leafy sepals, which enfold



FIG. 20.—ROSA FOSTERI.

the bud, and remain on after the expansion of the corolla. In *Rosa Fosteri*, (see *fig. 20*,) and

its near ally the Dog rose (*R. canina*), the sepals (*a*) do not extend far beyond the petals of the bud; but in some species, as in *Rosa cinnamomea* and its allies, the sepals are so large and long, that they assume the character of little leaves. The corolla is cup-shaped, and it is composed of five equal petals, each of which is more or less indented in the margin, as shown at *b*. In the centre of the flower the receptacle forms a kind of disk which completely fills the opening or throat of the calyx; in most species covering the carpels and their styles and only leaving the stigmas free, though in the Ayrshire rose (*R. arvensis*), and its allies, the styles are united, so as to form a column, which projects considerably above the disk (see *fig. 21*).

The pitcher-shaped part of the calyx when the corolla falls becomes the hip (*fig. 20 c*), and serves as a covering or false pericarp to the numerous bony carpels



FIG. 21.—OVARY OF THE AYRSHIRE ROSE WITH A DETACHED SEED.

or nuts which contain the seed. These nuts are each enveloped in a hairy cover (see *fig. 20 d*, and *fig. 21 a*), and each contains only one seed which it does not open naturally to discharge: hence, the seeds of roses when sown

are a long time before they come up. *Fig. 22* is the ripe fruit of *Rosa cinnamonea*, cut in two to show the nuts. The leaves are pinnate, consisting of two or more pairs of leaflets, and ending with an odd one. The leaves are furnished with very large stipules (see *fig. 20 e*); and the stems have numerous prickles



FIG. 22.—RIPE FRUIT
AND DETACHED SEED
OF A ROSE.

(*f*), which differ from thorns in being articulated, that is, they may be taken off without tearing the bark of the stem on which they grow, only leaving the scar or mark, shown at *g*. The leaves of the sweet briar are full of small glands or cells filled with fragrant oil, which may be distinctly seen in the shape of little white dots, when held up to the light; and this is the reason of their delightful perfume. When the leaf is rubbed between the fingers, the thin skin that covers the cells is broken, and the oil being permitted to escape, the fragrance is increased. There are only two genera in this tribe, viz. *Rosa* and *Loqua*, the latter containing only what was formerly called *Rosa berberifolia*, and which has been thought worthy of being made into a separate genus principally on account of its having simple leaves without stipules, and branched prickles.

TRIBE II.—POTENTILLEÆ OR DRYADEÆ.

THE plants belonging to this tribe agree more or less in the construction of their flowers with the well-known showy plants called *Potentilla*, but my readers will probably be surprised to hear that the raspberry and the strawberry are included among them. If, however, they compare the flower of the *Potentilla* with that of the strawberry, they will find them very much alike. In both there is a calyx of ten sepals, and a cup-shaped corolla of five petals; and in both the stamens form a ring round an elevated receptacle, on which are placed numerous carpels. Here, however, the resemblance ceases, for as the seeds of *Potentilla* ripen, the receptacle withers up in proportion to the swelling of the carpels, till it becomes hidden by them; while in the strawberry the receptacle becomes gradually more and more dilated, swelling out and separating the bony carpels still farther and farther from each other, till at last it forms what we call the ripe fruit. I have already had several times occasion to mention the receptacle, which though seldom seen, or at least noticed, by persons who are not botanists, is a most important part of the flower, and one that assumes a greater variety of form than any

other. Sometimes, as we have seen in several of the Ranunculaceæ and Leguminosæ, it is a mere disk or flat substance serving as a foundation to hold together the other parts of the flower; and at other times we have found it drawn out into a thin membrane and divided into a kind of leaves, as it is among the carpels of the tree-peony; but in no plants that I have yet had occasion to describe does it assume such strange forms as in Rosaceæ.

The flower of the strawberry (*Fragaria vesca*) has a green calyx of ten sepals; five of which are much smaller than the others, and grow a little behind them, the large and small ones occurring alternately. The corolla is cup-shaped, and in five equal petals; the stamens are numerous and arranged in a crowded ring round the carpels, which are placed on a somewhat raised receptacle. The carpels or nuts resemble those of the rose, but they have no hairy covering, and indeed look hard and shining on the surface of the distended receptacle, or polyphore as it is called in its metamorphosed state. The carpels when ripe do not open to discharge the seed, and consequently as they are sown with the seeds, the young plants are a long time before they appear. The strawberry has what is called ternate leaves, that is, leaves consisting of three leaflets; with large membranous stipules.

The calyx is persistent, that is, it remains on till the fruit is ripe.

The Raspberry (*Rubus Idæus*) differs widely from the strawberry in many particulars, notwithstanding their being included not only in the



same natural order, but in the same tribe. The calyx has only five sepals (*a* in figure 23); and though the corolla has five petals (*b*), they do not form a cup-shaped flower. In the centre are the carpels, the

FIG. 23.—FLOWERS AND FRUIT OF THE RASPBERRY.

form of which is shown of the natural size at *c*, and magnified at *d*, the latter showing that each has a separate style and stigma. As the raspberry advances, the petals drop, and the receptacle becomes elevated into what is called a torus, as shown of the natural size at *e*; bearing the carpels upon it, which gradually swell out and soften, till each becomes a little pulpy fruit,

full of juice, and having the stone or seed in the centre. While this change is taking place, the stamens gradually wither and fall off, and the stigmas disappear, the style shrivelling up to the appearance of a hair; the pulpy carpels have also become so pressed against each other, as to adhere together, and the whole, with the persistent calyx, now assumes the appearance shown at *f*. As soon as the carpels become ripe they cease to adhere to the torus, and they may be pulled off and eaten (the torus, or core as it is called, being thrown away): each carpel will be found to inclose a very hard seed or stone, as shown at *g*. If the Raspberry, instead of being gathered, be suffered to remain on the stalk, the juicy carpels dry up, and fall with the seed inclosed. The stems of the Raspberry are bien-nial, that is, they do not bear till they are two years old, after which they die; but the roots are perennial, and they are always sending up fresh suckers, so that the same plants will bear for many years in succession, though not on the same stems. The stems are generally erect, and prickly like the rose; and the leaves on the bearing stems have three leaflets, while those on the barren stems have five; and in both cases the leaflets are covered with white down on the under side. All the different kinds of Bramble, such as the Dewberry, Blackberry, &c., agree

with the Raspberry in the construction of their fruit, though they differ in the number of their leaflets, the size and colour of their flowers, and other minor particulars.

Several other genera belong to this tribe, among which may be mentioned *Geum Avenæ*, or *Herb Bennet*, the carpels of which have each a hooked style; *Sieversia* separated from *Geum*, because the carpels end in a straight feathery awn; and *Tormentilla*, the flowers of which bear a general resemblance to those of *Potentilla*, but which have an eight-parted calyx; a corolla of four petals; sixteen stamens, and dry wrinkled carpels on a depressed receptacle. All these genera my readers will find it interesting to procure flowers of, in order to compare them with each other. This and the preceding tribe are considered by some modern botanists to form the order Rosacæ; the other tribes being formed into separate orders.

TRIBE III.—SPIRÆÆÆ.

THE only genera in this tribe which contain well-known plants are *Spiræa* and *Kerria*. In *Spiræa* the calyx is five-cleft (see *a* in *fig.* 24) and lined with the dilated receptacle, forming a shallow tube or rather cup for the reception of the carpels. There are five small roundish

petals (*b*), and from twenty to fifty stamens (*c*), which project very far beyond them. In the



FIG. 24.—FLOWER OF THE SPIRÆA.

centre are from two to five carpels (*d*), which are something like those of the raspberry when young, but afterwards become of the kind called follicles; each carpel contains from two to six seeds affixed to its inner suture, and they are dehiscent—that is, they open naturally at the top to discharge the seed (see *e*). The flowers are set very close together, and from this circumstance, combined with their small size and projecting stamens, they look like fine filigree work; hence the popular English names given to *S. salicifolia* or Bridewort, Queen's needle-work, &c. The flowers of this species are in spicate racemes, but others are in corymbs, as in *S. bella*; or in panicles, as in *S. ariæfolia*.

Kerria is a genus containing only one species, the plant which was formerly called *Corchorus japonica*; the calyx is united at the base, but divided in the upper part into five lobes; three of them obtuse, and the other two tipped with

a little point called a mucro. There are about twenty stamens about the same length as the petals arising from the calyx, and five roundish carpels containing one seed each. The leaves are simple, and the stipules awl-shaped. Till lately only a double-flowered variety was known in Britain; but about 1832, the single-flowered plant was introduced from China. *Corchorus*, the genus in which this plant was originally placed, is nearly allied to the lime-tree.

TRIBE IV.—AMYGDALÆÆ.

THIS tribe is distinguished by the fruit, which is what botanists call a drupe, that is, a stone fruit. The principal genera included in this tribe are *Amygdalus*, the Almond; *Persica*, the Peach and Nectarine; *Armeniaca*, the Apricot; *Prunus*, the Plum; and *Cerasus*, the Cherry. All these genera contain more or less of prussic acid, which is found to exist principally in the leaves and kernels; and they all yield gum when wounded.

The flowers of the common Almond (*Amygdalus communis*) appear, as is well known, before the leaves, bursting from large scaly buds, which when they open throw off the brown shining bracts in which they had been enwrapped. The calyx is somewhat campanulate, with the upper

part cut into five teeth or lobes, and it is lined by the dilated disk. There are five petals, and about twenty stamens, both inserted in the lining of the calyx. The anthers are innate, and they differ from most of the other plants yet described in being only one-celled. The ovary is also only one-celled, and there are generally two ovules, though the plant rarely ripens more than one seed. The leaves are simple, and they have very small stipules. When the petals drop, the ovary appears covered with a thick tough downy pericarp, within which is the hard stone or nut, the kernel or almond of which is the seed.

The Peach (*Persica vulgaris*) was formerly included in the same genus as the almond ; and in fact there is but little botanical difference. The flowers are the same both in construction and appearance ; and the leaves are simple like those of the almond, and, like them, they are conduplicate (that is, folded together at the mid-rib) when young. The only difference indeed is in the fruit ; for, as everybody knows, the stone of the peach has not a dry tough covering, like that of the almond, but a soft and melting one full of juice, and the stone itself is of a harder consistence, and deeply furrowed, instead of being only slightly pitted. The fruit of the peach has thus a fleshy pericarp, the pulp or sarcocarp of

which is eatable, and a furrowed nut or stone, inclosing the seed or kernel, which is wrapped up like that of the almond, in a thick loose skin.

The Nectarine (*P. lævis*) only differs from the peach in the epicarp, or outer covering of the pulpy part, being smooth instead of downy. Of both fruits there are two kinds, one called free-stone, from their parting freely with the stone; and the other cling-stone, from the stone clinging to the fibres of the pulp.

The Apricot (*Armeniaca vulgaris*) agrees with the preceding genus in its flowers; but it differs in its fruit, its stone being sharp at one end and blunt at the other, with a furrow on each side, but the rest of the surface smooth. Thus my readers will perceive that the Peach and the Apricot, though so different from each other as to be recognised at a glance, are yet botanically so very closely allied, as to be distinguished only by the stone. The leaves indeed differ in form, but in other respects they are exactly the same.

The Sloe (*Prunus spinosa*) is supposed by some botanists to be the origin of our cultivated plum, though others make it a separate species under the name of *Prunus domestica*. The flowers in both are solitary (see *fig.* 25), and consist of a five-toothed calyx (*a*) which is united at the base, and in the lining of which the

stamens are inserted as shown at *b*. The ovary has a thick style and capitate stigma (*c*),



FIG. 25.—FLOWERS AND FRUIT OF THE SLOE.

and the fruit is a drupe (*d*). In these particulars therefore the plum agrees with the preceding genera; but it will be found to differ in the skin of the pericarp, which is quite smooth and covered with a fine bloom; this, indeed, and its stone being pointed at both ends constitute the chief botanical distinctions between the fruit of the plum and that of the apricot, as in other respects they are alike. Both the plum and the apricot have footstalks, and in this differ from the peach and the nectarine, which are without. The leaves of the plum differ from those of the other genera in being convolute, that is, rolled up, in the bud.

The Cherry (*Cerasus vulgaris*) differs from the plum in the skin of the pericarp being destitute of bloom, and in several flowers springing from each bud, in what botanists call a fascicled umbel (see *a* in *fig.* 26). The pedicels (*b*) are also much longer; the petals (*c*) are indented in the margin; the style (*d*) is more slender; and the stone (*e*) is smooth and much more globose. The number of the stamens, and the manner in which they are inserted in the lining of the

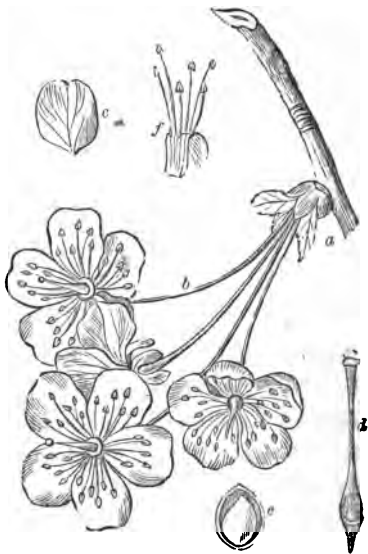


FIG. 26.—FLOWERS AND STONE OF THE CHERRY.

calyx, is the same in both genera (see *f*); but the leaves are different, for those of the Cherry are folded down the middle, when young, like those of the peach and almond; while those of the plum are rolled up.

The genus *Cerasus* is divided into two sections, the first containing those species which have their flowers in bunches, and on long footstalks, as in the common Cherry; and the second those which have their flowers in racemes on short footstalks, as in the Bird-cherry (*Cerasus Padus*); the Mahaleb, or Bois de Sainte Lucie (*Cerasus Mahaleb*); the common Laurel (*Cerasus Lauro-Cerasus*); and the Portugal Laurel (*Cerasus lusitanicus*). These plants are so different from the common Cherry both in flowers and fruit, as far as can be judged from their general appearance, as scarcely to be recognised; but when closely examined their botanical construction will be found the same. Formerly only two genera were included in this tribe—viz. *Amygdalus*, which comprised the Peach and Nectarine as well as the Almond; and *Prunus*, which included the Apricot and the Cherry.

TRIBE V.—POMEÆ.

THE common apple (*Pyrus Malus*) may be considered the type of this tribe, which comprehends not only what we are accustomed to callkerneled fruit, but also the Hawthorn, Cotoneaster, and other ornamental shrubs and low trees. The flower of the apple bears con-

siderable resemblance to the flowers of the genera already described, but the petals (see *a* in *fig.* 27) are oblong, rather than roundish.

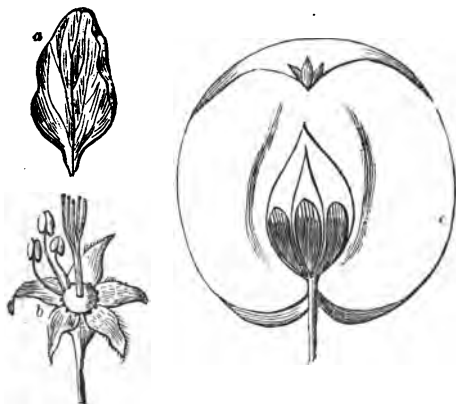


FIG. 27.—FRUIT AND PART OF THE FLOWER OF THE APPLE.

The calyx (*b*) is tubular in the lower part, and the limb is divided into five lobes. The receptacle lines the lower part of the calyx, and forms a disk, filling its throat, in which the stamens and petals are inserted. There are five ovaries, the styles of which are for half their length united, leaving the upper part and the stigmas free; and the ovaries themselves, now become cells, are enclosed in a cartilaginous endocarp, which forms what we call the core of the Apple, and which adheres firmly to the tubular part of the calyx. There are two ovules in each cell, placed

side by side, but generally only one seed in each becomes perfectly ripe. As the seeds advance, the fleshy tube of the calyx swells out and becomes what we call the apple; while the leafy part or lobes of the limb remain on, and form the eye. Fruit of this kind are called pomes.

The Pear (*Pyrus communis*) differs from the apple in the shape of the fruit (see *a* in *fig.* 28),

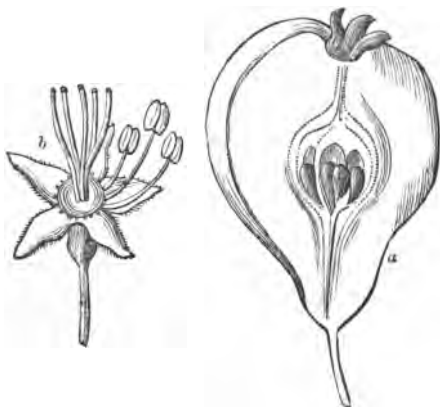


FIG. 28.—FRUIT AND PART OF THE FLOWER OF THE PEAR.

which tapers towards the footstalk, instead of being umbilicate, that is, indented at the point of the insertion of the footstalk, as is the case with the Apple. The construction of the flowers in both species is the same, except that the styles are quite free for their whole length in the Pear, and not partially united into a column

as in the Apple. This distinction, and some others, have been thought, by some botanists, sufficient to constitute the Apple and its allied species into a separate genus under the name of *Malus*. The leaves of the Pear differ from those of the Apple in being the same colour on both surfaces, whereas those of the Apple are covered with a white down on the under side.

Besides the Apple and the Pear, and their respective allies, which form two distinct sections of the genus *Pyrus*, that genus, being a very extensive one, is divided into several other sections, all the plants contained in which may be arranged under two heads: viz., those that formerly constituted the genus *Sorbus*; and those that were once called *Aronia*.

The Mountain Ash (*Pyrus aucuparia*) may be considered as a fair specimen of most of the trees belonging to the *Sorbus* division. By the details of the flowers of this species given in *fig. 29*, it will be seen that the petals (*a*)

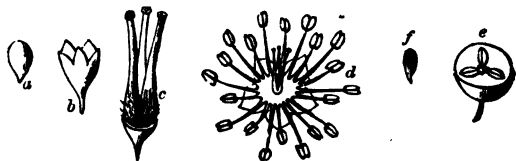


FIG. 29.—FLOWER AND FRUIT OF THE MOUNTAIN ASH.

are very small and concave; and the calyx (*b*)

is tubular, and five-cleft. There are three styles, as shown at *c* ; and the stamens (*d*), which project far beyond the petals, are inserted in the disk. The fruit (*e*) is a pome with three seeds (*f*) enclosed in a cartilaginous membrane, like the core of the apple or pear. The leaves of the Mountain Ash are impari-pinnate, that is, they consist of several pairs of leaflets, terminating in an odd one; and the flowers are produced in corymbs. The White Beam-tree (*Pyrus Aria*), the wild Service (*P. torminalis*), and several similar trees, belong to this division and have the same kind of fruit as the Mountain Ash. The true Service, however, differs in its fruit being generally shaped like a pear, though there is a variety with apple-shaped fruit. One species (*P. pinnatifida*) has the leaves lobed to the midrib, instead of being cut into leaflets; and this gives the name to the species; leaves of this description being called pinnatifid. The leaves of the genus *Pyrus* often have their petioles dilated and somewhat stem-clasping at the base; but they have generally only small stipules.

Among the other plants included in the genus *Pyrus*, may be mentioned the beautiful shrub now called *Pyrus arbutifolia*, which has been successively included in the genera *Cratægus*, *Aronia*, and *Mespilus*; and *P. Chamæmespilus*,

which has been successively called *Cratægus*, *Mespilus*, and *Sorbus*. There are several beautiful low shrubs belonging to this division of the genus *Pyrus*.

The genus *Cydonia*, the Quince, differs from *Pyrus* in having its seeds arranged in longitudinal rows, instead of being placed side by side. In the Chinese Quince there are thirty seeds in each row, arranged lengthways of the fruit. The ovary of this genus consists of five cells, each containing one row of seeds, the seeds being covered with a kind of mucilaginous pulp. The well-known plant, formerly called *Pyrus japonica*, has been removed to the genus *Cydonia* on account of its ovary and the disposition of its seeds, which are decidedly those of the Quince. It differs, however, from the common Quince in its seeds, which are arranged in two rows in each cell.

The common Hawthorn (*Cratægus Oxyacantha*) has generally only two styles (see *a*, *fig. 30*), but the



FIG. 30.—FLOWER AND FRUIT OF THE HAWTHORN.

number of styles varies in the many different species included in the genus from one to five. The corolla, calyx, and stamens are the same as

in the other genera included in this tribe, but the petals (*b*) are rounder and rather more indented. The seeds vary from one to five, each being enclosed in a bony covering, or stone, the whole being surrounded by the fleshy part of the calyx, which forms the eatable part of the Haw. In some of the species the haws are so large as to appear like little apples; but they may be always easily distinguished by the ripe ovary, or case which incloses the seed, being bony; whereas in all the varieties of *Pyrus*, the outer part of the ovary is cartilaginous, like the core of the apple. Theseeds of the Hawthorn are a long time before they come up, from the hardness of this bony covering, which does not open naturally when ripe. The species composing the genus *Raphiolepis*, the Indian Hawthorn, have been separated from *Cratægus*; chiefly on account of the covering which encloses the seeds being of a paper-like texture, instead of bony, and each cell containing two seeds. The limb of the calyx also falls off before the fruit is ripe, instead of remaining on to form what is called an eye, as it does in the common Hawthorn. The leaves of the plants belonging to this genus vary in the different species; but those of the common Hawthorn are wedge-shaped, and cut deeply into three or five lobes. The different species which compose the genus

Cratægus were formerly considered to belong to the genus *Mespilus*. This genus, which is now almost confined to the common Medlar (*Mespilus germanica*), agrees with *Cratægus* in having each seed enclosed in a bony covering, but it differs in the limb of the calyx being in large leafy segments; and in the disk being very large and visible even when the fruit is ripe, from the tubular part of the calyx not closing over it.

Among the plants formerly included in the genus *Mespilus*, may be mentioned *Photinia serrulata*, and *Eriobotrya japonica*, both natives of Japan. The first of these was once called *Cratægus glabra*, and it is remarkable for its beautiful glossy leaves, which are of a deep green when old, and beautifully tinged with red when young; the flowers are white, and they are produced in what botanists call corymbose panicles. There are some other species of the genus *Photinia*, but only two or three are common in British gardens. *Eriobotrya japonica*, the Loquat-tree, was formerly called *Mespilus japonica*. It is remarkable for its large and handsome leaves, which are woolly on the under side. The flowers, which are small and white, are produced in large panicles, and they are followed by large pendulous bunches of the yellow pear-shaped fruit, which is covered with

a woolly substance, and hence the botanic name *Eriobotrya*, which signifies woolly grapes. The tree will stand out in the open air in England, and it will flower freely in a greenhouse, but it requires a stove to ripen its fruit.

Cotoneaster and Amelanchier were also formerly included in *Mespilus*, and they are very closely allied to *Photinia* and *Eriobotrya*. The species belonging to *Photinia*, however, are easily known by their shining leaves, and the petals of their flowers being reflexed, that is, curved back; and the species of *Eriobotrya* are distinguished by their woolliness, which spreads over even the flowers and fruit. The *Cotoneasters* are known by the small petals of their flowers, which curve inwards, and remain a long time without falling. The leaves are also thick, and woolly or clothed with rusty hair on the under side; and the flowers, which are produced in cymes or panicles, with woolly pedicels, are followed by bright red haws, resembling those of the hawthorn. Lastly, the genus *Amelanchier* is known by its long narrow petals, and its ovary having five or ten cells, with five styles united at the base.

TRIBE VI.—SANGUISORBEÆ.

THE plants included in this tribe agree more or less with the common Burnet (*Sanguisorba*

officinalis). This plant, which is found in great abundance in rich meadows on calcareous soils, has its flowers produced in a close terminal spike. The flowers have no petals, but the calyx, which is four-cleft, is pink, and there are four glossy brown bracts to each flower; so that, on the whole, the flowers are rather ornamental, notwithstanding their want of petals. There are only four stamens, and two carpels with slender styles and pointed stigmas. The leaves are pinnate, consisting generally of nine leaflets, and each pair of leaflets is furnished with two stipules. The Alchemilla, or Ladies' Mantle, is nearly allied to the Burnet; but the flowers are in small corymbs, instead of spikes. The flowers have no petals; but the limb of the calyx is coloured, and divided into eight unequal segments. There are generally four stamens and only one style, though sometimes there are two. The ovary contains one or two carpels, each containing a single seed, and these when ripe are enclosed in a capsule, formed by the tubular part of the calyx becoming hardened. The leaves are lobed, plaited, and serrated at the margin; and those of the Alpine species (*A. alpina*), which is often found wild on the Scotch mountains, are covered with a beautiful silky substance of the most brilliant whiteness.

CHAPTER IV.

THE ORDER ONAGRACEÆ: ILLUSTRATED BY THE DIFFERENT KINDS OF FUCHSIA; *ÆNOTHERA*, OR THE EVENING TREE-PRIMROSE; *GODETIA*; *EPILOBIUM*, OR THE FRENCH WILLOW-HERB; AND *CLARKIA*.

THE type of this order is considered to be the common evening Tree-primrose (*Ænothera biennis*), and it takes its name from *Onagra*, the name given by Tournefort to the genus. The *Fuchsia* seems so unlike the *Ænothera*, that it appears difficult to any but a botanist to trace the connexion between them; but, botanically, they agree in the position of the ovary, which in both is so placed as to seem rather to belong to the flower-stalk than to the flower; and this peculiarity is found in all the genera included in the order. The parts of the flowers are also always either two, four, eight, or twelve; as, for example, there are four petals and eight stamens in both the *Fuchsia* and the *Ænothera*.

THE GENUS FUCHSIA.

LITTLE more than fifty years ago, the first *Fuchsia* was introduced into England; and we are told that small plants of it were sold at

a guinea each. Now more than twenty species, and innumerable hybrids and varieties, are in common cultivation, and we find them not only in greenhouses and windows, but planted in the open air as common border shrubs. The first Fuchsia seen in England was *F. coccinea*, introduced in 1788; and this species is still common in our gardens. It was followed about 1796 by *F. lycoides*; and after that no other species was introduced till 1821, since when a full tide of Fuchsias has kept pouring in upon our gardens, from the different parts of Mexico, South America, and New Zealand, to the present time.

All the Fuchsias were formerly divided into two sections; the plants in one of which having the stamens and pistil concealed, and those in the other having the stamens and style exerted, that is, projecting beyond the other parts of the flower. The first division comprises all the small-flowered kinds; such as *F. microphylla*, *thymifolia*, *cylindracea*, and *bacillaris*, all which have the lobes of the calyx short, and the petals partially concealed. *F. parviflora* belongs to this division, but it is distinguished by its glaucous leaves with an entire margin; and *F. lycoides* is also included in it; though this last seems to form the connecting link between the two sections, as both its petals and its style and stamens are partially exposed. The second division

comprises all the kinds which have long projecting stamens.

As the general arrangement of the parts of the flower is nearly the same in both divisions, *fig. 31*, which represents the section of a flower of *F. cylindracea*, from the *Botanical Register*, will give my readers a clear idea of the botanical construction of the Fuchsia. In this figure, *a* shows two cells of the ovary (which when entire is four-celled, opening when ripe into four valves), with the seeds attached to a central placenta. This ovary is surrounded and protected by the dilated disk, which also serves as a lining to the tubular part of the calyx, *b*. The anthers, in this division, have very short fila-



FIG. 31.—SECTION OF THE FLOWER OF
FUCHSIA CYLINDRACEA.

ments, which are inserted in the lining of the calyx, as shown at *c*; *d* is the style, which, in fact, consists of four styles united together, and which divides near the apex into four stigmas; *ee* are two of the four lobes of the calyx; and *f* is one of the four petals.

In the second division, of which *F. coccinea*

may be considered the type, the calyx and the corolla are of different colours. In *fig. 32*, which shows a flower of *F. discolor*, the Port Famine Fuchsia, the calyx (*a*) is scarlet and the most ornamental part of the flower, while the petals (*b*) are purple, and wrapped over each other. The ovary (*c*) is green, and when the petals and calyx fall off, it swells into a berry, which becomes of a dark purple when ripe. *F. globosa* differs from *F. coccinea* in the flowers being shorter and more globose, while the limb of the calyx curves inward. In *F. macrostemma*, a well-known Fuchsia, the lobes of the limb of the calyx are, on the contrary, recurved, that is, turned backwards. This



FIG. 32.—FUCHSIA
DISCOLOR.

formation is common, more or less, to several other species. In *F. excorticata*, the New Zealand Fuchsia, there is a large fleshy knot at the base of the calyx, and strong ribs running up the lobes; the calyx is green when young, but it afterwards becomes crimson; and the petals are very small. This species is so different from the others, that it was at first described as a new genus, under the name of *Skinnera*. The

calyx is green at first, but it afterwards becomes crimson. *F. arborea* has pale-purplish flowers, and, like *F. lycoides*, forms a connecting link between the two sections, the stamens being only a little exerted, and the petals hidden.

F. radicans, the only *Fuchsia* yet discovered with a creeping stem, which was introduced in 1841, belongs to this division.

These sections include all the *Fuchsias* known in British gardens previously to 1835 ; but since that period, two kinds have been introduced, which belong to a third division. These are *F. fulgens* and *F. corymbiflora*. In these plants the tube of the calyx is about two inches long, and the lobes are very short. The petals are also short, and scarlet or deep-rose colour, though not exactly of the same hue as the calyx. The leaves are large, with the midribs and veins red ; and the branches and pedicels are also of a dark reddish purple.

THE GENUS CENOTHERA.

In the description of the botanical construction of the *Fuchsia*, my readers may have observed, that the ovary is placed below the calyx, and quite distinct from it. The same construction is still more visible in the *Cenothera*, as the tube of the calyx is very slender, and often more than two inches long, while the ovary is often vase-

shaped, and of large size. The calyx of *Æno-thera biennis*, the common Evening or Tree Primrose, consists of four sepals growing together in the lower part, so as to form a long tube (*a* in *fig. 33*), and with the upper part or limb generally in two segments (*b*), which are bent quite



FIG. 33.—THE EVENING PRIMROSE (*Ænothera biennis*).

back when the corolla expands, and which may be easily divided with a pin into four. There are four petals in the corolla (*c*), and they are placed so as to wrap over each other at the base. The calyx is lined with the dilated receptacle, and in this lining are inserted the filaments of the eight stamens (as shown at *d*) ; the stamens

having versatile anthers, that is, anthers attached to the filament by the middle, so as to quiver at every breath. The pollen contained in the cells of these anthers feels clammy when touched; and its particles, when magnified, will be found to be triangular, and connected by small threads, a form of construction peculiar to this genus and its allies. The style is long, and the stigma is four-cleft. The ovary (*ee*) is situated at the base of the calyx, and when ripe, it becomes a four-celled dry capsule, which bursts into four valves, opening at top to discharge the seed. The seeds, when young, are attached to the central placenta, and they are quite free from hair or wool of any kind.

The genus *Œnothera* being a very extensive one, it has been divided by M. Spach, a German botanist residing in Paris, into fourteen new genera; but only one, or at most two, of these genera have been adopted by other botanists. One of these *Godetia*, which embraces all the purple-flowered kinds, has been divided from *Œnothera*, on account of a slight feathery appearance on the seeds; whereas the seeds of the true yellow-flowered *Œnotheras* are naked, that is, without the slightest appearance of any feathery substance or wing. The other genus, *Boisduvalia* *Spach*, includes only two species, both with pink flowers, which are very seldom

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seen in British gardens. The generic mark of distinction consists in four of the stamens in these species being shorter than the other four; whereas in the true *Oenotheras* all the eight stamens are of equal length. As M. Spach's other genera have not been adopted by any British botanist, it is not worth while troubling my readers with the distinctions between them. The flowers of the yellow *Oenotheras* only open in the evening, or in cloudy weather; but those of the purple kinds, or *Godetias*, remain open all day. The leaves in both kinds are alternate.

THE GENUS EPILOBIUM.

THIS genus is well known, by the showy plant often seen in shrubberies, called the French Willow - Herb — (*Epilobium angustifolium*), and the English weed called Codlings-and - Cream (*E. hirsutum*). In this genus, the tubular part of the calyx which incloses the ovary, is quadrangular, as



FIG. 34.—EPILOBIUM ROSEUM.

shown at *a* in *fig. 34*, which represents seed-vessels of *Epilobium roseum*, a very common weed in the neighbourhood of London. The limb of the calyx is four-cleft, and the corolla has four petals; and when these fall off, the ovary assumes the appearance shown at *a*. The quadrangular form is retained by the capsule, which, when it ripens, bursts open into the four valves (*b*), and discharges the seed which was attached to the central placenta (*c*); each seed being furnished with a little feathery tuft resembling pappus, as shown in *fig. 35*. The genus *Epilobium* is divided into two sections; the plants in one of which have irregular petals, the stamens bent, and the stigma divided into four lobes, as in the French Willow-Herb, and the other showy species; and the plants in the other section having small flowers with regular petals, erect stamens, and the stigma undivided.



FIG. 35.—SEED
OF EPILOBIUM.

THE GENUS CLARKIA.

THE calyx in this genus is tubular, with the limb in two or four lobes, as in *Oenothera*. The corolla is, however, very different, the four petals being unguiculate or clawed; that is, so much narrower in the lower part as to stand widely apart from each other; they are also three

lobed. The stamens are very different, only four of them being perfect, and the anthers of the other four being wasted and destitute of pollen; and the stigma is divided into four leaf-like lobes, very different from those of all the other genera included in the order. The capsule is cylindrical in shape, and furrowed on the outside; it is four-celled, and when ripe, it bursts open by four valves. The seeds are quite naked.

Among the other genera belonging to this order, I may mention the following: *Gaura*, the petals of which are somewhat unguiculate, like those of *Clarkia*, but not three-lobed as in that genus; the segments of the limb of the calyx often adhere two together, so as to appear three instead of four; the ovary is one-celled, and the seeds naked: *Lopezia*, which has apparently five irregular petals, though, on examination, one will be found to be a metamorphosed stamen, a four-cleft calyx, two stamens, including the one converted into a petal, and a globular, four-celled capsule: and *Circæa*, or Enchanter's Nightshade, which has the limb of the calyx apparently in only two segments, and only two petals and two stamens; the capsule is globular like that of *Lopezia*, but it is covered with very small hooked bristles, and it is divided into only two cells, each containing only one seed.

CHAPTER V.

THE ORDER RUBIACEÆ: ILLUSTRATED BY THE CINCHONA, OR PERUVIAN BARK; LUCULIA GRATISSIMA; CAPE JASMINE; RONDELETIA; COFFEE; IXORA; IPECACUANHA; MADDER; GALIUM; WOODRUFF; AND CRUCINELLA STYLOSA.

THIS order contains more than two hundred genera; but by far the greater part of these are composed of tropical plants, many of which are not yet introduced into Britain. Several of the genera, on the other hand, are British weeds; and this difference in habit, with others in the qualities of the plants, &c., have occasioned some botanists to divide the order into two: one of the new orders being called Cinchonaceæ, and containing the plants most resembling Cinchona; and the other Galiaceæ, containing the plants most nearly allied to Galium or Bedstraw.

The characteristics of Rubiaceæ, in its most extended sense, are that the ovary is surrounded by the calyx, and placed below the rest of the flower; and that the corolla has a long tube, lined with the dilated receptacle, in which the stamens are inserted. In most of the species, the filaments are very short, and the anthers nearly or entirely hidden in the corolla; and in many cases,

the segments of the calyx remain on the ripe fruit, as they do in the genus *Pyrus* in *Rosaceæ*, where they form what is called the eye in the apple and pear.

The qualities of the *Cinchona* division of the *Rubiaceæ* are generally tonic ; but some of the plants, as for example the *Ipecacuanha*, are used as emetics, and one (*Randia dumetorum*) is poisonous. The qualities of the *Galium* division are not so decidedly marked ; but the roots of some of the plants are used for dyeing.

THE GENUS CINCHONA, AND ITS ALLIES.

THE well-known medicine called Peruvian bark is produced by three species of the genus *Cinchona* ; the pale bark, which is considered the best, being that of *C. lanceolata*. The flowers of this species are small, and of a very pale pink. The calyx (see *a* in fig. 36) is bell-shaped, and five-toothed ; and the corolla (*b*) is tubular, with the limb divided into five lobes, and silky within, as shown in the magnified section at *c*. The stamens (*d*) have very short filaments, which are inserted in the throat of the corolla. The ovary (*e*), which is deeply furrowed when young, is inclosed in the calyx ; it is two-celled, with a single style, and a two-lobed stigma (*f*). The capsules retain the lobes of the calyx as a sort of crown (*g*) ; and they open naturally at the

division between the two cells, as shown at *h*, beginning at the base. The cells (*i*) each con-



FIG. 36.—CINCHONA, PERUVIAN BARK (*CINCHONA LANCEOLATA*).

tain several seeds. *C. oblongifolia*, which yields the red bark of the shops, has cream-coloured flowers, as large as those of a Jasmine, which they resemble in shape; and *C. cordifolia*, which produces the yellow bark, has flowers like the first species, and heart-shaped leaves. The singular plant called *Hillia longiflora*, is nearly allied to Cinchona; as is also the beautiful and delightfully fragrant *Luculia gratissima*. In this last plant the tube of the calyx is very short, and pear-shaped, and the segments of the limb are short, and sharply pointed. The corolla is salver-shaped, with a long tube, and a spreading, five-parted limb. The anthers are nearly sessile, and the short filaments to which they are at-

tached are inserted in the throat of the corolla, only the tips of the anthers being visible. The stigma is divided into two fleshy lobes, and the capsule splits, not like that of *Cinchona*, but from the apex to the base in the centre of each cell. The seeds are very small, and each has a toothed, membranous wing. The flowers of this beautiful plant are produced in a large head, and at first sight greatly resemble those of a *Hydrangea*; but they are easily distinguished by their delightful fragrance.

Manettia cordifolia, a very pretty stove-twiner often seen in collections, is very nearly allied to *Luculia*, differing principally in the shape of the flowers, which in *Manettia* have a long tube and a very small limb. *Bouvardia triphylla* and the other species of *Bouvardia*, and *Pinckneya pubescens*, belong to this division; and such of my readers as have the living plants to refer to, will find it both interesting and instructive to dissect them and compare the parts of their flowers with the description I have given of *Luculia* and *Cinchona*, so as to discover the difference between the different genera; afterwards reading the generic character of each given in botanical works, that they may see how far they were right.

THE GENUS GARDENIA AND ITS ALLIES.

THE Cape Jasmine (*Gardenia radicans*) is a well-known greenhouse plant, remarkable for the heavy fragrance of its large white flowers, which die off a pale yellow, or buff. The calyx has a ribbed tube, and the limb is parted into long awl-shaped segments. The corolla is salver-shaped, that is, it has a long tube and a spreading limb, the limb being twisted in the bud. There are from five to nine anthers, having very short filaments which are inserted in the throat of the corolla. The stigma is divided into two erect fleshy lobes. The ovary is one-celled, but there are some traces of membranes, which would, if perfect, have divided it into from two to five cells. The seeds are numerous and very small. *Gardenia radicans* is a dwarf plant, which flowers freely when of very small size, and is easily propagated from the readiness with which its stem throws out roots; but *G. florida* is a shrub five or six feet high, and much more difficult to cultivate. In both species the flowers are generally double, and the petals are of a fleshy substance, which gives the corolla a peculiarly wax-like appearance.

There are many other species, but the two above-mentioned are the most common in British gardens. *Burchellia capensis* is gene-

rally considered to belong to this division of Rubiaceæ, though its flowers bear more resemblance to those of Cinchona; and the singular plant called *Mussaenda pubescens*, the flowers of which are small and yellow, but the bracts are so large and so brilliantly white as to look like flowers; *Posoqueria versicolor*, an ornamental plant lately introduced, belong to this division.

THE GENUS RONDELETIA AND ITS ALLIES.

Rondeletia odorata, sometimes called *R. coccinea*, and sometimes *R. speciosa*, is a very fragrant stove shrub, a native of Cuba. The flowers are produced in corymbs, and their botanical construction is shown in the magnified section *fig. 37*. In this *a* is the ovary inclosed in a hairy calyx; *b* shows the limb of the calyx cut into awl-shaped segments; *c* shows the manner in which the very short filaments of the anthers are inserted in the throat of the corolla; *d* shows the termination of the dilated receptacle which lines the tube of the corolla; and *e* the segments of the

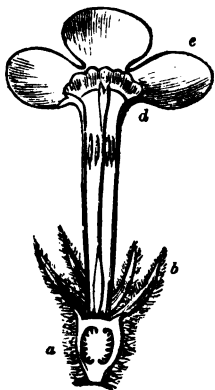


FIG. 37.—SECTION OF THE
FLOWER OF RONDELETIA.

limb. I have given the section of this flower, that my readers may compare it with the section of the flower of the *Cinchona* in *fig. 36*, in p. 87, and may see the general resemblance which connects the two plants in the same order, and the differences which mark them to be of different genera. *Fig. 38* is a tuft of flowers of *Rondeletia odorata*. *Wendlandia* is nearly allied to *Rondeletia*; as is the magnificent *Portlandia grandiflora*, which somewhat resembles *Brugmansia lutea* in shape though not in colour, as its flowers are white.



FIG. 38.—PART OF THE HEAD
OF FLOWERS OF RONDELETIA.

THE GENUS COFFEA AND ITS ALLIES.

THE Coffee-tree (*Coffea arabica*) differs from the other Rubiaceæ in the tube of its calyx being very short and disappearing when the ovary begins to swell; and in the filaments of the stamens being sufficiently long to allow the anthers to be seen above the throat of the corolla (see *a* in *fig. 39*). The limb of the corolla (*b*) is five-cleft, and the style (*c*) bifid. Each ovary when its flower falls, becomes distended into a berry (*d*) or rather drupe, containing the nut *e*, in which are two seeds, flat

on one side, and convex on the other, which are placed with the flat sides together, as shown at *f*; each seed having a deep longitudinal groove, as shown at *g*. These seeds are our coffee.



FIG. 39.—COFFEE. (*Coffea Arabica*.)

The flowers of *Ixora coccinea* have the same general construction as those of the other plants of the order. The calyx has an ovate tube, and a very small four-toothed limb; and the corolla is salver-shaped, with a long and very slender tube, and a four-parted spreading limb. There are four anthers inserted in the throat of the tube of the corolla, and just appearing beyond it, and rising a little above them is the point of the style with its two-cleft stigma. The berry

is two-celled, but it differs from that of the coffee in retaining the lobes of the calyx, which form a sort of crown. There are many kinds of *Ixora*, all stove shrubs, and all conspicuous for their large heads or rather corymbs of showy flowers. The genus *Pavetta* has been divided from *Ixora*, principally because the species composing it have the style projecting considerably beyond the corolla, instead of only just appearing above it.

The drug called *Ipecacuanha* is the produce of two plants belonging to this order, *Cephælis Ipecacuanha* and *Richardsonia scabra*; though a spurious kind is made from the roots of three species of *Viola*, all natives of South America, and a still inferior one from the roots of a kind of *Euphorbia*, a native of Virginia and Carolina. It is important to know this, as the best kinds possess tonic properties as well as emetic ones, while the inferior kinds are only emetics, and they are very injurious if taken frequently. The best brown *Ipecacuanha* is the powdered root of *Cephælis Ipecacuanha*; a plant with small white flowers collected into a globose head, which is shrouded in an involucre closely resembling a common calyx. The true calyx to each separate flower is small and roundish, with a very short five-toothed limb. The corolla is funnel-shaped, with five small bluntish lobes.

The anthers are inclosed in the corolla, and the stigma, which is two-cleft, projects only a little beyond them. The berries are two-celled and two-seeded, and they retain the lobes of the calyx. The root is fleshy and creeping. *Richardsonia scabra*, which produces the white Ipecacuanha, has its flowers also in heads, but the calyx is larger in proportion to the corolla, and the stamens and style are both visible. The capsule contains three or four one-seeded nuts, crowned by the calyx; which, however, becomes loosened at the base, and falls off, before the seeds are quite ripe. *Cephalanthus*, *Spermacoe*, and *Crusea*, are nearly allied to *Richardsonia*.

The above plants all agree, more or less, with *Cinchona*, in their qualities, and they are all included by Dr. Lindley in the order *Cinchonaceæ*.

THE GENUS GALIUM AND ITS ALLIES.

THE common Bedstraw (*Galium vernum*) is a British weed, common in dry fields and on little knolls, which produces its cluster of bright yellow flowers in July and August. The flowers are so small that it is difficult to examine them in detail, but, by the aid of a microscope, the ovary will be found to be inclosed in the tube of the calyx as in the other *Rubiaceæ*,

though the calyx has hardly any limb. The corolla is what is called rotate or wheel-shaped, and its limb is divided into four segments. There are four short stamens, with their filaments inserted in the throat of the corolla, and two very short styles. The fruit is a dry capsule inclosing two seeds. Thus far the construction of the plant agrees with the other Rubiaceæ, but the stem is square, and the leaves are different, for they are without footstalks, and are disposed in what is called a whorl (see *fig. 40*). The whorl, however, according to Professor De Candolle, does not consist entirely of leaves; but of two opposite leaves and two or more stipules, which are so like the leaves as scarcely to be distinguished from them, though upon close examination,



FIG. 40.—WHORL OF LEAVES
OF BEDSTRAW. (*Galium verum*.)

it will be found that the leaves have buds in their axils (that is between them and the stem), which the stipules have not. This theory is not adopted by Dr. Lindley, who considers the whorl to consist entirely of leaves, and to be one of the distinctive marks of his order Galiaceæ.

All the plants in this division of Rubiaceæ

agree with the common Bedstraw (*Galium ver-num*) in the formation of their leaves and stem ; but the species of *Galium* are distinguished by the margins of the leaves and the principal veins, in nearly all the species, being covered with prickles, which in some cases point forwards, and in others are bent back, so as to catch everything they touch. This is particularly the case with the leaves of the plant called Goose-grass, or Cleavers (*Galium aparine*) ; and its fruit is covered with hooked bristles, which take so firm a hold as to make it difficult to separate them from anything they have caught hold of. The pretty little weed called Field Madder (*Sherardia arvensis*), the fragrant Woodruff, (*Asperula odorata*), and *Rubia peregrina*, the only British species of Madder, all agree with *Galium* in its more important characters ; and as they are all common weeds, my readers will probably find it interesting to trace the differences between them. *Galium* and *Rubia* agree in having scarcely any limb to the calyx, and a rotate corolla ; but the limb, which is only four-parted, or even three-parted, in *Galium*, has always five lobes in *Rubia* ; there are also five stamens in *Rubia*, and the fruit is a berry ; whereas there are only four stamens in *Galium*, and the fruit is dry. *Sherardia* agrees with *Asperula* in having a funnel-shaped corolla with a four-

cleft limb ; but in *Sherardia* the limb of the calyx remains on as a crown to the fruit, while in *Asperula* it drops off. In *Sherardia* there is only one style with a two-lobed stigma ; and in *Asperula* there are two styles united at the base.

There is a very pretty plant called *Crucinella stylosa*, which has lately been much cultivated in gardens, and which belongs to this order. This plant has large heads of pretty pink flowers, each of which has a funnel-shaped corolla, with a long tube concealing the anthers, but beyond which the style projects so far as to give rise to the specific name of *stylosa*. The stigma in this plant is clavate, that is, club-shaped, and it is cleft in two, though the lobes are not spreading.

CHAPTER VI.

THE ORDER COMPOSITÆ: ILLUSTRATED BY THE SUCCORY, THE SOW-THISTLE, THE DANDELION, THE BURDOCK, THE DAISY, THE CHRYSANTHEMUM, FEVERFEW, PELLITORY OF SPAIN, WILD CHAMOMILE, TRUE CHAMOMILE, YARROW, THE BUR-MARIGOLD, GROUNDSEL, RAGWORT, BIRD'S TONGUE, PURPLE JACOBÆA, CINERARIA, SUNFLOWER, MUTISIA, AND TRIPTILION.

THE plants composing the order Compositæ have all compound flowers, which differ from other flowers as much as a compound leaf does from a simple one. As the compound leaf is composed of a number of leaflets or pinnæ united by a common petiole; so a compound flower is composed of a number of florets, united by a common receptacle, which is surrounded by a calyx-like involucre, so as to give the whole mass the appearance of a simple flower. Each floret has a calyx, the tubular part of which is rarely sufficiently distinct to be perceptible, but the limb is generally cut into long feathery segments called pappus. The ovary of each floret contains only one seed; and the fruit, which is called an achenium, retains the pappus when ripe, and falls without opening. There are five stamens, the filaments of which are distinct, but the anthers grow together so as to

form a kind of cylinder, through which passes the style, ending in a two-lobed stigma (see *a* in *fig. 41*). Most of the corollas are of two



FIG. 41.—LIGULATE
FLORET OF WILD
LETTUCE.

kinds: viz. the ligulate, as exemplified in the floret of the wild Lettuce (*Lactuca virosa*) shown in *fig. 41*; and the tubular, as shown in a floret of the Cotton-thistle (*Onopordium Acanthium*) see *fig.*

42. All the British species of Compositæ have their florets either entirely of one of these kinds, or of the two mixed together; but some foreign genera have florets with two equal lips, cut into three or four lobes, as shown in a floret of *Mutisia latifolia*, at *e*, *fig. 46*, p. 108. These florets are called bilabiate. It will be observed that in all these examples, as indeed, in all the flowers belonging to the order, that the pappus (*b*, in *figs. 41* and *42*), is always on the outside of the corolla, thus plainly indicating its connexion with the calyx.



FIG. 42.—TUBULAR
FLORET OF THE
COTTON-THISTLE.

The order Compositæ is a very large one, above seven thousand species having been

named and described; and to assist the memory in retaining the names of this great number of plants, various means have been devised for dividing the order into sections and tribes. The principal botanists who have proposed means of arranging this order, are Cassini, Lessing, and lastly the late Professor De Candolle, in three volumes of his *Prodromus* published in 1840. But as the distinctions between the divisions proposed, lie in the difference found in the stigmas and pappus of the different genera, I have judged them too troublesome for my readers, as I am sure they are for myself, and I have preferred following the plan adopted by Dr. Lindley in his *Elements of Botany*, published in 1841, and dividing the Compositæ into four tribes; viz., the three originally proposed by Jussieu, and a fourth added by Professor De Candolle, containing the plants with bilabiate florets, which were either not known, or overlooked, by Jussieu. It may perhaps be necessary to add, that this arrangement forms the basis of the new one proposed by De Candolle, and that the principal difference consists in the subdivisions.

TRIBE I.—CICHORACEÆ.

Florets ligulate. Juice milky, narcotic.

THE plants contained in this tribe bear more or less resemblance to the common Succory (*Cichorium Intybus*). This beautiful plant, which is found in great abundance wild in many of the sandy and chalky districts of England, has large bright blue flowers, which when examined will be found to consist of a number of florets, all of the kind called ligulate, that is somewhat like a corset of paper; the upper part being broad and flat, and serrated at the edge. The pappus in this genus is very short, and it is scaly rather than feathery. The leaves are bitter, and when broken give out a milky juice; and the fleshy roots when roasted are used to adulterate coffee. The Endive is a variety of this species, or another species of the same genus. The Sowthistle (*Sonchus oleraceus*) abounds in the same milky juice as the succory, and has the same kind of fleshy root. The flower is composed of a scaly involucre (shown at *a* in *fig. 43*) and a number of ligulate florets (see *b*), which when they fall show the pappus (*c*), forming a feathery ball. The manner in which the pappus is attached to the seed-vessel is shown at *d*; and the receptacle after the florets have been pulled out, but with the involucre still

attached to it, at *e*. A detached floret is shown at *f*. The Dandelion (*Leontodon Taraxacum*)

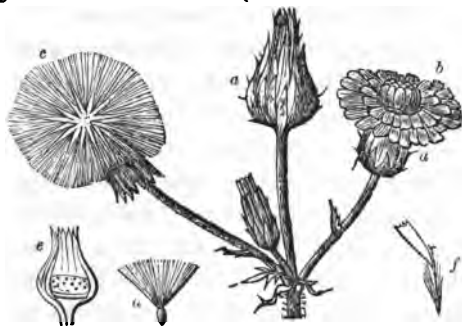


FIG. 43.—SOWTHISTLE. (*Sonchus oleraceus*.)

differs from the Sowthistle : in its florets, which are flatter and looser ; in its receptacle, which is globular ; and above all, in its pappus, which is what is called stipitate or stalked, that is, the tubular part of its calyx rises to a considerable height above the capsule, before it becomes divided into its feathery segments, as shown in *fig. 44*. The leaves of this plant are what is called runcinate, that is, the lobes into which they are cut point downwards towards the root instead of upwards from it, and the root is also fleshy. The Lettuce, Salsafy or Goat's-beard, Ox-tongue, Hawkweed, Cat's-ear, Nipplewort or Swine's Succory, and many other well-known plants, belong to this tribe.



FIG. 44.—
SEED OF THE
DANDELION.

TRIBE II.—CYNAROCEPHALÆ.

Florets tubular. Juice watery, tonic.

THE plants in this division all bear more or less relation to the common Artichoke (*Cynara Scolymus*). The scales of the involucre are generally fleshy at the base, but terminate outwardly in a sharp hard point. The florets are tubular, and intermixed with them in the receptacle are frequently found the hardened bracts, which in this state are called paleæ, and which appear to be of a chaffy substance, as exemplified in the choke of the Artichoke, the fleshy receptacle being in this plant what we call the Artichoke bottom. This peculiar formation is shown more in detail in *fig. 45*, which represents part of the flower of the common Bur or Burdock (*Arctium Lappa*), so annoying from the strong hold it takes of any part of the dress which it may chance to touch. In *fig. 45* *a* is the involucre, every scale in which is hooked and



FIG. 45.—PART OF THE FLOWER-HEAD OF THE BURDOCK.

turned inwards, so as to hold firmly whatever it may catch; *b* is a floret showing its tubular shape, and its style proceeding through the

united anthers; *c* shows the hardened bracts or paleæ, the other florets having been removed; and *d* shows a fruit with a palea attached, magnified. All the different kinds of thistle belong to this division; and though many of the kinds have not the hardened bracts, they have all a spiny involucre. The pappus of the thistle is generally attached to a kind of disk, from which it becomes loosened soon after the seed falls, and this thistle, down, as it is called, being extremely light, is blown about by the winds. All the thistles have fleshy roots, and take firm hold of the soil. The Corn Blue-bottles (*Centaurea*), the Wild Saffron (*Carthamus tinctoria*), and many other well-known plants, belong to this division.

TRIBE III.—CORYMBIFERÆ.

Florets partly tubular and partly ligulate; juice watery; sometimes bitter and tonic, and sometimes acrid. The seeds of some of the species yield oil.

THE plants included in this tribe all bear more or less resemblance to the common Daisy. In this well-known flower, the white florets are all ligulate, and compose what is called the ray, and the yellow flowers, which are tubular, are called the disk. The involucre is simple and leafy, and the receptacle is conical. The seeds are without pappus. The Chrysanthemum is

nearly allied to the Daisy, and its seeds also are destitute of pappus; but it is easily distinguished by its involucre, which is scaly, and by the flower forming a kind of depressed globe in the bud. The scales of the involucre are strongly marked, from being edged with a thin membrane, and the florets of the ray are much longer in proportion to those of the disk than in the Daisy. The great Ox-eye Daisy, which was formerly called *Chrysanthemum leucanthemum*, is now placed in a new genus, and called *Leucanthemum vulgare*; and the Chinese Chrysanthemums have been removed to the genus *Pyrethrum*. Both plants, however, will no doubt long continue to be called by their old names. The beautiful yellow-flowered plant often found growing among corn (*Chrysanthemum segetum*), the three-coloured Chrysanthemum (*C. tricolor* or *carinatum*), and the yellow annual Chrysanthemum (*C. coronarium*), with some others, have been left by Professor De Candolle in their old genus. In the Feverfew (*Pyrethrum*), the receptacle is elevated, and the fruit is crowned with a narrow membrane. The Pellitory of Spain was formerly considered to belong to this genus, and afterwards to the Chamomile, but it is now called *Anacyclus Pyrethrum*. *Matricaria Chamomilla*, the wild Chamomile, has also no pappus; and in this plant the receptacle is

almost cylindrical. The true Chamomile (*Anthemis nobilis*) greatly resembles the Chrysanthemum in its flowers; but they are distinguished by having a chaffy receptacle, and the fruit having a membranous margin. The smell of the Chamomile is aromatic, and its qualities highly tonic. The Yarrow (*Achillea millefolium*) is another plant destitute of pappus, but with a chaffy receptacle; it is also remarkable for its leaves, which are doubly pinnatifid.

It will be seen by the above enumeration, that in many plants belonging to this division, the pappus is entirely wanting, and in others it will be found to assume a different form to that which it bears in the other tribes. Thus, in the Bur-Marigold (*Bidens*), the pappus consists of from two to five erect awns, which are covered with very small, bent bristles. The genus *Senecio* has soft, hairy pappus, as may be seen in the common Groundsel (*S. vulgaris*); the leaves of this weed are pinnatifid, and somewhat stem-clasping, and the flowers have no ray florets. In other species of this division, however, the ray florets are very conspicuous: as, for example, in the common yellow Ragwort (*S. Jacobæa*), in the great fen Ragwort, or Bird's tongue (*S. paludosa*), and in the purple *Jacobæa* (*S. elegans*). Nearly allied to *Senecio*, is the genus *Cineraria*, so much, indeed, that Professor De Candolle,

in his late arrangement of the Compositæ, has included the greater part of the species in Senecio. The green-house species, with purple flowers, are among those which have been changed; but they will probably always retain the appellation of Cineraria, as an arbitrary English name. The Asters, or Michaelmas Daisies, Golden Rod, Elecampane, Leopard's Bane, the Cape Marigold, (now called *Dimorphotheca*, instead of being included in the genus *Calendula*), Coltsfoot, Wormwood, Southernwood, Tansy, and many other well-known plants, belong to this division.

The Sun-flower (*Helianthemum annuus*) is an example of one of the plants belonging to this division which has seeds yielding oil. In this plant the pappus is awl-shaped, and deciduous; and the receptacle, which is broad and somewhat convex, is paleaceous. The seeds are large and oblong, and when pressed, yield a considerable quantity of oil. The *Madia* is another oil plant; and indeed the seeds of several in this division yield oil.

TRIBE IV.—LABIATÆFLORÆ.

Florets bilabiate.

THE plants belonging to this division are rarely seen in British gardens; but when they do occur, they are well worth examining, from

the singularity of their formation. *Mutisia latifolia* (see fig. 46) has a large, woolly involucre, the



FIG. 46.—FLOWER AND LEAF OF
MUTISIA LATIFOLIA.

scales of which are of two kinds, the outer ones, (a), being pointed and leaf-like, and the inner ones, (b), having the appearance of scaly bracts. The florets of the ray, (c), are narrow, and spreading in the fully expanded flower; and those of the disk, (d), are shorter, erect, divided into

two lips, which curl back, and the lower one of which is again divided into two segments (as shown at e in the detached floret). The leaves of this plant are very curious; the midrib is lengthened and drawn out into a tendril, as shown at f, and the petiole (g) is decurrent. There are several other genera belonging to this tribe, but none of them are particularly ornamental except *Triptilion spinosum*, which has flowers of the most brilliant blue, that do not lose the intensity of their colour in drying.

CHAPTER VII.

THE ORDER ERICACEÆ: ILLUSTRATED BY THE COMMON OR BESOM HEATH, THE MOOR HEATH, CAPE HEATHS, LING OR HEATHER, ANDROMEDA, LYONIA, ST. DABÆOC'S HEATH, ARBUTUS, THE BEARBERRY, GAULTHERIA, CLETHRA, RHODODENDRON, INDIAN OR CHINESE AZALEAS, YELLOW AZALEA, AMERICAN AZALEAS, RHODORAK, ALMIA, MENZIESIA, LOISELEURIA, LEDUM, LEIOPHYLLUM, THE BILBERRY, THE WHORTLEBERRY, THE CRANBERRY, PYROLA, AND MONOTROPA.

THE name of *Ericaceæ*, which most people are aware signifies the Heath family, conjures up immediately the image of a number of narrow-leaved plants, with globular, ventricose, or bell-shaped flowers; and we are apt at first to think that the family is so natural a one, as to require very little explanation. Did the order include only the Heaths, this would be the case, for all the Heaths, different as they are in some particulars, may be recognised at a glance: but as the order includes the *Rhododendrons*, *Azaleas*, and *Kalmias*, besides several other plants which have not so strong a family likeness to each other as the Heaths, it becomes necessary to say a few words on the botanical resemblances which connect them together. The first, and most striking, of these is the shape of the anthers, each of which appears like two

anthers stuck together, and the manner of their opening, which is always by a pore or round hole, in the upper extremity of each cell. The filaments, also, in all the genera, except *Vaccinum* and *Oxycoccus*, grow from beneath the seed-vessel, being generally slightly attached to the base of the corolla. There is always a single style with an undivided stigma, though the capsule has generally four cells, each containing several of the seeds, which are small and numerous. The calyx is four or five cleft, and the corolla is tubular, with a larger or smaller limb, which is also four or five cleft. The order has been divided into four tribes, which I shall describe in this chapter, though some of these are considered as separate orders by Dr. Lindley and other botanists.

TRIBE I.—ERICÆÆ.

THIS tribe, which comprehends all the heath-like plants, has been re-divided into two sub-tribes, one containing the genera most nearly allied to the heaths, and the other those be-



FIG. 47.—THE BESOM HEATH (*Erica Tetralix*).

longing to the Andromeda. In both there is a honey-bearing disk under the ovary, and the leaves are generally rolled in at the margin, as shown at *a*, in *fig. 47*.

SUB-TRIBE I.—ERICAÆ NORMALES.

ALL the genera in this sub-tribe, twenty-two in number, were formerly included in the genus *Erica*; and some botanists still consider all the species to belong to that genus, with the exception of those included in *Calluna*, while others adopt about half the new genera. In this uncertainty, I shall only describe two of the doubtful genera, partly because the distinctions between them and the true heaths are strongly marked, and partly because the species they contain are frequently met with in British gardens and greenhouses, where they are sometimes labelled with their old names and sometimes with their new ones.

In the genus *Erica*, one of the commonest species is the Besom Heath (*E. tetralix*), which is found in great abundance on moorish or boggy ground in every part of Britain. In this plant, the corollas of the flowers appear each to consist of a single petal, forming an egg-shaped tube (see *b* in *fig. 47*), contracted at the mouth, but afterwards spreading into a four-cleft limb, through which is seen projecting the style, with

its flat stigma. The corolla is, however, really in four petals, which, though they adhere together, may be easily separated with a pin. The stamens are concealed by the corolla, but the manner in which they grow is shown at *c*; and *d* is a single stamen, showing the spurs or awns at the base of the anther, the position of which is one of the characteristics of the genus *Erica* in its present restricted form; *e* is a capsule with the style and stigma attached; and *a* is a leaf showing its revolute or curled back margin. The leaves of this species are in whorls, four leaves in each whorl, and they are ciliated, that is, bordered with a fringe of fine hairs.

All the true Heaths bear more or less resemblance to this plant. In some, the corollas are bell-shaped, spreading out at the tip into five teeth, which inclose the stamens, as shown in *fig. 48*; and in others they are nearly globose swelling out near the calyx, and tapering to a



FIG. 48.—
BELL-SHAPED
HEATH.

point, beyond which the stigma and anthers project; as in the Cape Heath, called *Erica hispida*, a flower of which is shown in *fig. 49*. The leaves also differ, exceedingly, in the number contained in each whorl; as in some species



FIG. 49.—CAPE
HEATH.
(*E. hispida*.)

there are only three in a whorl,

while in others they are five or six. The general features of all the Heaths are, however, the same—viz., there are eight stamens, which are generally inclosed in the corolla, though they sometimes project beyond it, as shown in *fig.* 49, and the anthers of which are two-cleft, and awned or crested at the base, while the filaments are hair-like; one style, which always projects beyond the corolla, and has a flattened stigma; a four-parted calyx and corolla which is tubular, with a four-parted limb. There are nearly two hundred species of this genus, some of which are natives of Europe, and others of the Cape of Good Hope.

The moor Heaths (*Gypsocalis*) were separated from the genus *Erica*, by Mr. Salisbury, principally on account of the corolla being campanulate, or shortly tubular, with a dilated mouth; and the stamens projecting beyond the corolla. The filaments are also generally flat; the anthers are without awns, and distinctly in two parts; and the stigma is simple, and scarcely to be distinguished from the style. The common Cornish Heath (*G. vagans*), and the Mediterranean Heath (*G. Mediterranea*), are examples of this genus, which appears strongly marked, though, as I before mentioned, some botanists do not adopt it.

Callista is a genus established by the late

Professor Don, which appears very distinct, though it also has not been generally adopted. It includes all those beautiful Cape Heaths which have a shining, glutinous, ventricose, or cylindrical corolla with a spreading limb (see *a* in *fig.* 50), and a capitate stigma (*b*). *C. bucciniflora* and *C. ventricosa*, are examples of this genus.

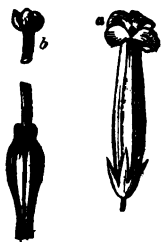


FIG. 50.—*CALLISTA*
BUCCINIFLORA.

The Ling or Heather, which Linnæus called *Erica vulgaris*, is now generally placed by all botanists in a separate genus called *Calluna*, which was established by Mr. Salisbury. The calyx of this plant is membranous, and coloured so as to resemble a corolla, and it is furnished with four bracts at the base, which resemble a calyx. The true corolla is bell-shaped, and shorter than the calyx. The stamens are inclosed, and the anthers are of the very singular form shown in *fig.* 51.



FIG. 51.—
STAMEN OF THE
LING.

The stigma is capitate, and the flowers are disposed in what is called a racemose spike. The leaves are trigonal; they are very short, and they are laid over each other like scales in four rows. The Ling is the only species in the genus.

SUB-TRIBE II.—ANDROMEDEÆ.

THE plants in this sub-tribe differ decidedly from those of the preceding division, in having ten stamens, while all the genera of heaths have only eight. The calyx is also five-cleft instead of four; and the corolla, which falls before the seeds are ripe, has a five-lobed limb. The sub-tribe is divided into twenty genera, more than half of which are perfectly distinct.

The genus *Andromeda* is distinguished by its globose corolla which has a five-lobed limb; and its stamens which have their filaments bearded, and their anthers short and two-awned. *Fig. 52* shows a stamen of the wild rosemary (*Andromeda polifolia*) with its bearded filament (*a*), and its two-awned anther with its pore-like openings (*b*). The cells of the capsule open in the middle, down the back, to discharge the seeds. Professor Don has divided the genus *Andromeda* into six genera; some of which contain only one or two species. Thus only *Andromeda polifolia* and *A. rosmarinifolia* are left in the genus *Andromeda*; *Cassandra* contains only *A. calyculata*, and *A. angustifolia*; and *Zenobia*, only the beautiful



FIG. 52.—
STAMEN OF
ANDROMEDA.

Andromeda speciosa. In *Cassandra* the anthers are long and mutic (see *a* in *fig. 53*), and the leaves (*b*) are without veins, and white and full of dots on the underside, the edges being curled inwards; and in *Zenobia* the corolla



FIG. 53.—LEAF
AND ANTHER
OF CASSANDRA.

is bell-shaped, with the limb, which is in five lobes, curling back (see *a* *fig. 54*). The stamens have the filaments (*b*) curiously dilated at the base;

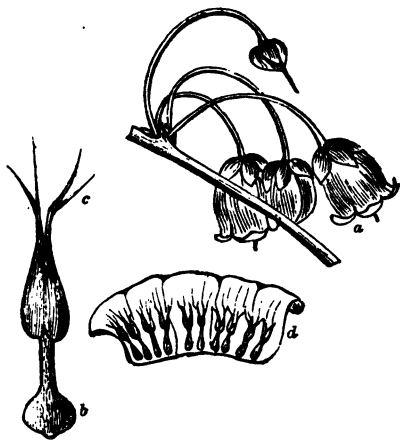


FIG. 54.—FLOWERS, COROLLA, AND STAMEN OF ZENOBIÆ.

and the point of each cell of the anther is cut into two erect awns (*c*). The manner in which the stamens are arranged inside the corolla is

shown at (d). The cells of the capsule, when ripe, open down the centre, and the seeds which are angular, are attached to a five-lobed placenta.

Lyonia is a genus established by the American botanist Nuttall, because the plants it contains have the margins of the valves of their capsules closed by five other narrow external valves. The plants are natives of North America, and their flowers are generally small. *Lyonia Mariana* may serve as an example of this genus, which is generally adopted by botanists.

It would be useless to enter into details of the other genera formed out of *Andromeda*, as they are not generally adopted ; but, perhaps, it may be worth mentioning, that the well-known *Andromeda floribunda* is placed by Professor Don in a new genus which he calls *Leucothoe*.

St. Dabeoc's Heath, or Irish Whorts, a little heath-like shrub, common in Ireland, is one of those plants which have puzzled botanists exceedingly. It has been called successively *Erica*, *Andromeda*, and *Menziesia*, *Dabæcia* ; then *Erica Hibernica*, next *Menziesia polifolia*, then *Vaccinium Cantabricum* and lastly *Dabæcia polifolia*. It is probable, however, that it may even yet be doomed to undergo other changes ; as, from the construction of its anthers, which are linear, and arrow-shaped at the base, and

which open lengthways, instead of by pores, it does not appear even to belong to the Ericaceæ.

The other genera in this sub-tribe are quite distinct from each other, and contain several well-known plants. The most popular of these genera are *Arbutus*, *Arctostaphylos*, *Gaultheria*, and *Clethra*.

The Strawberry tree (*Arbutus Unedo*) has little bell-shaped flowers, contracted at the mouth, and with a curling-back limb, which are easily recognised as belonging to the Ericaceæ. They have ten stamens, the filaments of which are hairy at the base (see *a* in *fig. 55*) and



FIG. 55.—FRUIT &c. OF *ARBUTUS UNEDO*.

inserted in the disk; which in this genus is large, and rises up round the ovary (see *b*). The calyx is permanent, and five-cleft; and

the flowers are produced in panicles, and each is furnished with a bract. The fruit, which retains the calyx when ripe, is a granular berry, covered with tubercles on the outside; and it has five cells (*c*) containing the seeds. There are numerous varieties of this species common in British gardens, besides a very beautiful hybrid

between it and *A. Andrachne*. The latter species is a native of Greece, and rather more tender than the common kind; and it is very conspicuous in shrubberies from its red stems and loose bark.

The Bearberry (*Arctostaphylos Uva-Ursi*) was formerly considered to belong to the genus *Arbutus*, but it differs in the filaments of the stamens being smooth and dilated at the base, and the awns affixed to the middle of the anthers. The berry is without tubercles, and the cells are often only one-seeded.

There are two species of *Gaultheria* common in British gardens: viz.—*G. procumbens* and *G. Shallon*: both of which have flowers resembling those of the *Arbutus* and furnished with bracts; but in the former species the flowers are solitary and produced from the axils of the leaves, and in the latter they are in racemes, of the kind called secund, that is with the flowers growing all on one side. The berries of both kinds are eatable, and those of *G. procumbens* are called Partridge berries in America, and the leaves Mountain tea. Both species have ten stamens, the anthers of which are two-cleft, each cell being furnished with two horns, as in *Zenobia speciosa* (see *fig.* 54, in page 116). The fruit is five-celled and the seeds are numerous.

The genus *Clethra* differs considerably from the preceding genera, as the limb of the corolla is so large and so deeply cleft, as to make the flower appear to have five petals (see *a* in *fig. 56*). There are ten stamens, with broad arrow-shaped anthers (*b*), and a three-cleft stigma, (*c*). The capsule is dry, with three many-seeded cells. In *C. alnifolia*, a native of North America, (of which *fig. 56* represents a magnified flower,) the flowers are erect, and produced in a spicate raceme; but in *C. arborea*, a native of Madeira, the racemes are paniced, and the flowers drooping and somewhat bell-shaped. Both species are very ornamental.



FIG. 56.—FLOWER OF *CLETHRA*
ALNIFOLIA.

TRIBE II.—RHODOREÆ.

THE plants included in this tribe are all considered to bear more or less resemblance to the *Rhododendron*, though in some of them the family likeness is not very strong; and the genera I shall describe to illustrate it are

Rhododendron, Azalea, and Rhodora (the last two being by some botanists included in *Rhododendron*); *Kalmia*, *Menziesia*, and *Ledum*.

The species of the genus *Rhododendron* are easily distinguished by their flower buds, which are disposed in the form of a strobile, or pine-cone, each bud having its accompanying bract, which the flower retains after its expansion, as shown in *fig. 57* at *a*, in a flower of *R. maximum*.

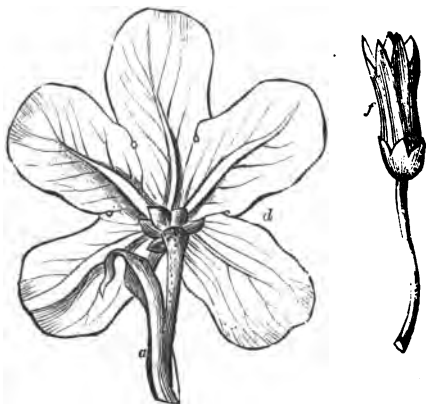


FIG. 57.—BACK VIEW OF A FLOWER OF RHODODENDRON MAXIMUM,
AND SEED-POD.

There are five or ten stamens of unequal length, the larger ones curling upwards (as shown at *b* in *fig. 58*), as does the style (*c*), which has a simple stigma. The flowers have a very small

calyx, (*d* in *fig.* 57,) and a campanulate corolla which is deeply five-cleft, the upper segment (*e* in *fig.* 58) being somewhat larger than the rest, and spotted in the inside. The capsule is five-celled and five-valved, as shown in *fig.* 57 *f*.



FIG. 58.—FLOWER OF RHODODENDRON PONTICUM.

The leaves of nearly all the species are ever-green; and the flowers are showy, and produced in terminal corymbs. The principal species may be thus distinguished from each other; *R. maximum* has drooping leaves, covered with brown or white down on the under surface, and a dense corymb of flowers, the segments of the corollas of which are roundish, and the bracts leafy. In *R. ponticum*, on the contrary, the corymbs of flowers are looser, the segments

more pointed, and the bracts more scale-like; and the leaves are smooth on both surfaces. The seed-pods also differ: in those of *R. maximum* and the other American species, the valves are smooth as shown at *f* in *fig. 57*; and in those of *R. ponticum*, the valves are somewhat crinkled as shown in *fig. 59*. This species, and all its hybrids and varieties, are more tender than *R. maximum*, *R. catawbiense*, and all the other American kinds and their offspring. *R. catawbiense* has the flower of a darker colour on the outside of the corolla than within, and the upper segment is very faintly dotted. It hybridises freely with *R. arboreum*, which *R. maximum* does not, and the hybrids thus produced are hardier than those raised from *R. ponticum*, though the latter are by far the most numerous.



FIG. 59.—SEED-
POD OF
RHODODENDRON
PONTICUM.

Most of the species have purple or whitish flowers, but some, such as *R. chrysanthemum*, and *R. anthopogon*, have yellow flowers; *R. ferrugineum* and *R. hirsutum*, have bright pink or rose-coloured flowers; and those of *R. arboreum* the Nepaul tree Rhododendron, are of a rich scarlet. The commonest small kinds are *R. ferrugineum* and *R. hirsutum*, both dwarf shrubs and natives of the north of Europe,

with funnel-shaped corollas, and leaves dotted on the under surface. They are so much alike as scarcely to be distinguished at first sight, but on examination the leaves of *R. ferrugineum* will be found to have brown dots, and to be plain on the margin; while those of *R. hirsutum* have white dots and are fringed with fine hairs.

Of all the species of the genus, those which differ most widely from the others are the Indian kinds. Of these *R. arboreum* has a ten-celled capsule, and the segments of the corolla two-lobed with waved margins. The leaves are long and silvery beneath; and the capsules, the peduncles, and the calyxes, are all woolly. In *R. campanulatum*, a splendid species with very large flowers, the capsule is six-celled, the leaves are somewhat cordate at the base, and the bracts are fringed; and in *R. anthopogon* the corolla has a cylindrical tube, woolly inside, and a small but spreading limb, cut into five lobes. There are eight stamens, and the capsule is five-celled.

R. Camtschaticum, *R. Chamæcistus*, and *R. dauricum* differ from the preceding species in having their corollas rotate, that is, wheel-shaped. The last of these kinds is a favourite greenhouse shrub, from its flowering under shelter in winter. In the open ground

it flowers in March. The species has rose-coloured flowers which appear before the leaves; and leaves which turn red in autumn before they fall. The roots are knobbed and fibrous; and the stems are twisted and knobbed in a wild state. There is a variety *R. d. atrovirens* which has purple flowers, and evergreen leaves, and which is hardier than the species.

The genus *Azalea* may be divided into three kinds, viz., *A. indica* and its allied species; *A. pontica* and its varieties and hybrids; and the American *Azaleas*. These divisions are easily distinguished by their flowers. Those of the Indian or Chinese *Azaleas* have all large showy flowers, on short downy footstalks, and they are produced in small clusters of only two or three flowers each, at the extremity of the shoots. The corollas are bell-shaped and deeply cut, nearly to the base, into broad spreading segments. The stamens are ten in number, shorter than the corolla, and of unequal length. The leaves are evergreen, and they are numerous, thickly set and downy. These *Azaleas* are all very handsome, but the white Indian *Azalea* (*A. indica alba*, or *A. ledifolia*) is particularly so, and very fragrant. The species belonging to this division are mostly natives of China, and require either a greenhouse or some slight protection during winter in England.

The yellow Azalea (*A. pontica* or *Rhododendron flavum*) differs from *A. indica* in being quite hardy; in the flowers being produced in umbels of from eight to twelve, at the ends of the branches, before the leaves; and in the corollas being funnel-shaped instead of campanulate. The tube of the funnel is, however, shorter than the limb, the segments of which are broad and spreading, the upper three being larger and of a darker yellow than the two below. There are usually five stamens, projecting a little beyond the corolla, and curving upwards; the style also curves upwards, and it is crowned by the stigma, which forms a round green head.

The calyx is very small, and both it and the corolla feel clammy to the touch. The flowers are fragrant. The leaves are deciduous, and they are ovate, slightly hairy, and terminate in a mucro or stiff point. There are many varieties of this species, and many hybrids between it and the American kinds, all of which are quite hardy in British gardens.

The principal American Azaleas are *A. nudiflora*, *A. viscosa*, *A. nitida*, and *A. speciosa*, all of which have the corollas of their flowers funnel-shaped. Of these *A. nudiflora* is easily known by its stamens, which project a long way beyond the corolla, and by the tube of the corolla being longer than the limb. The plant is deciduous; and

the flowers, which are produced in large terminal clusters, and which are not clammy, appear before the leaves. The common English name for this plant in some parts of the country is the American Honeysuckle, and the flowers are of various shades of red, pink, white, and purple. *A. calendulacea*, which some botanists make a variety of this species, has much larger flowers, and the leaves pubescent on both surfaces, whereas, in *A. nudiflora* the leaves are nearly smooth and green, with only a slight fringe of hairs round the margin. There are numerous varieties of *A. calendulacea*, the flowers of which are always either yellow, red, orange, or copper-coloured, and it is supposed to be the parent of the beautiful Ghent Azaleas. *A. viscosa* has the tube of the corolla equal in length to the limb, and rather short stamens; the flowers of this species are clammy. *A. hispidum*, which is generally considered a variety of *A. viscosa*, is still more clammy, and the tube of the corolla is wider and shorter; other probable varieties are *A. nitida*, which has shining leaves, and *A. glauca*, which has glaucous ones, as in both kinds the flowers are very clammy. *A. speciosa* has large flowers and leaves tapering at both ends. All the species of Azalea have five stamens, but some of the varieties have ten.

Rhodora canadensis is a little American shrub

with pink flowers, which appear before the leaves, and the corolla of which is bilabiate, the upper lip being the broadest, and cut into two or three teeth, and the lower only once cut. There are ten stamens, and the capsule is five-celled and five-valved. The leaves are deciduous, and slightly pubescent beneath; and the flowers are produced in small terminal clusters. This plant, as well as all the Azaleas above described, are now included by some botanists in the genus *Rhododendron*.

The genus *Kalmia* also belongs to this tribe. The flowers of this well known shrub are very curiously constructed. The corolla is salver-shaped, that is, nearly flat, and on the under side of the limb are ten protuberances, producing as many hollows on the upper side, in which lie half-buried the ten stamens. This singular construction gives the corolla that wrinkled appearance which has procured for the plant its American name of Calico flower; while, from the shape of the leaves, it is also frequently called the Mountain laurel; it is also called Sheep laurel from its being considered poisonous to those animals when they feed on it. There are several species, which differ from each other principally in the shape of their leaves and the size of their flowers.

Menziesia is a genus containing only three

species, of which *M. pilosa* (fig. 60) may be taken as an example. The flowers are small and bell-shaped, and the anthers (*a*) are without any awns or bristles; there are eight stamens,

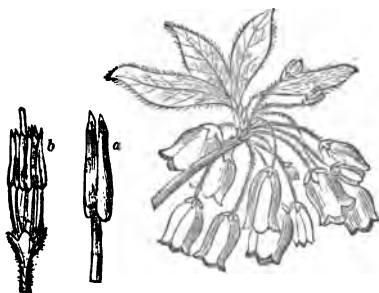


FIG. 60.—FLOWERS, ANTHERS, AND PISTIL OF MENZIESIA.

and the curious manner in which they are crowded round the style is shown at *b*. The capsule is four-celled.

Loiseleuria, or *Azalea procumbens*, is a small plant, having the appearance of thyme, which is the only species left in the genus *Azalea* by those botanists who include the true *Azaleas* in the genus *Rhododendron*.

Ledum is the last genus belonging to this tribe that I shall attempt to describe. *Ledum palustre*, or wild Rosemary, the best-known species, has a corolla in five regular petals, and ten stamens which project beyond it; but *L. latifolium*, the Labrador Tea, has only five stamens, which are

not longer than the petals. *L. buxifolium*, a little thyme-like shrub, is now called *Leiophyllum thymifolium*. All the species have white flowers.

TRIBE III.—VACCINIEÆ.

THE plants comprised in this tribe, which is considered a separate order by many botanists, all agree with the genus *Vaccinium* in having the ovary entirely surrounded by the calyx, which forms a fleshy berry-like fruit when ripe, and in the seeds being scaly. *Vaccinium Myrtillus*, the common Bilberry or Blaeberry, is a familiar example of the genus; and



FIG. 61.—COMMON
BILBERRY (*Vaccinium
tenellum*).

fig. 61 shows the shape of the flowers at *a*, the manner in which the ovary is enveloped in the calyx at *b*, and the curious shape of the anthers in the magnified representation of them at *c*. The berry is five-celled and many-seeded; and there are eight or ten stamens. Both the anthers and the flower vary in the different species, but the

calyx and the manner in which it surrounds the ovary are nearly the same in all, as may be seen in *fig. 62*, which represents a specimen of *V. tenellum*, the Pennsylvanian Whortle-berry. In

this figure *a* is the flower, *b* the anther, and *c* the ovary surrounded by the calyx.



FIG. 62.—AMERICAN WHORTLE-BERRY (*Vaccinium pennsylvanicum*).

There are many species, among which may be mentioned the American Bluets (*V. angustifolium*); Deerberries (*V. stamineum*); Bluetangles (*V. frondosum*); the Hungarian Whortle-berry (*V. Arctostaphylos*); and the Cow-berry, or common British Whortle-berry (*V. Vitis-Idæa*).

The Cranberry (*Oxycoccus palustris*) differs from the genus *Vaccinium* in the shape of its flowers (see *fig. 63*), and in its anthers being without spurs; there are eight stamens, the filaments of which are connivent, that is, growing close together. The American Cranberry (*O. macrocarpus*) differs from the European kind, principally in having larger fruit.



FIG. 63.—CRANBERRY.

TRIBE IV.—PYROLEÆ.

THIS tribe is also considered as a separate order by many botanists ; but the principal distinction is the long arillus or skin which enfolds the seeds and gives them the appearance of being winged. The most remarkable genera are *Pyrola*, the Winter Green, of which there are several species common in moist woods in the north of England and Scotland ; and *Monotropa*, or Bird's-nest, parasitic plants which grow on the roots of pine and beech-trees, but are by no means common in England. The species of *Pyrola* are pretty little evergreen plants, with white flowers, the corollas consisting of five distinct petals, and which have ten stamens, the anthers of which are two-celled, each opening by a pore ; the style is single, ending in a capitate stigma cut into five lobes ; and the capsule is five-celled. The yellow Bird's-nest, (*Monotropa Hypopitys*) has a coloured stem, with drooping flowers, and numerous scales instead of leaves, of which it is destitute. The flowers have a coloured calyx cut into four or five segments, and the corolla is in four or five petals. There is an American species with white flowers.

CHAPTER VIII.

THE ORDER OLEACEÆ, OR JASMINEÆ: ILLUSTRATED BY THE COMMON WHITE JASMINE; THE YELLOW JASMINE; THE PRIVET; THE PHILLYRÆA; THE OLIVE; THE FRINGE-TREE (*Chionanthus Virginica*); THE LILAC; THE COMMON ASH; AND THE MANNA OR FLOWERING ASH.

THIS order was established by Jussieu, who divided it into two tribes—Jasmineæ and Oleineæ, which are now very generally considered as distinct orders. I have, however, thought it best to keep them together, as I wish to make as few divisions as possible, to avoid burthening the memory of my readers. All the genera in both tribes agree in their flowers having only two stamens, an ovary with two cells, and two seeds in each cell; and anthers with two cells, which open with a long slit lengthways.

The species of the Ash have no corolla; but in all the genera where there is one, the filaments of the stamens, which are very short, are inserted in it; and it is generally funnel-shaped—as, for example, the corolla of the Jasmine. Though the ovary is two-celled, and the cells two-seeded, each flower very often only produces one perfect seed. The leaves are generally pinnate.

TRIBE I.—JASMINEÆ.

THE genus *Jasminum* is the only one in this tribe which contains plants common in British gardens; and of all the species contained in it, the common white Jasmine (*J. officinale*) is perhaps the best known. The flowers are produced in terminal clusters of four or six. The calyx is tubular, with the limb cut into numerous narrow segments; (see *a* in *fig. 64*;) and the



FIG. 64.—FLOWER AND LEAF OF THE JASMINE.

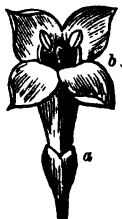
corolla is funnel-shaped, with a spreading limb (*b*) divided into four or five pointed segments, which are folded over each other, and somewhat twisted in the bud. The two stamens and the style and stigma are enclosed in the corolla; and the fruit is a berry divided into two cells, with one seed in each. There is no albumen

in the seeds. The leaves (c) are impari-pinnate, with the single terminating leaflet larger than the others; and the petioles are articulated. The common yellow Jasmine (*J. fruticans*) has flowers in terminal clusters of three each, and its leaves are either ternate, that is, with three leaflets, or simple. The branches are angular, and the leaves quite smooth. The Nepaul yellow Jasmine, (*J. revolutum*) has pinnate leaves of five or seven leaflets, which are smooth and shining. The flowers are large and produced in compound corymbs. They are a bright yellow, and very fragrant. The segments of the corolla are obtuse, and the stigma club-shaped. There are above seventy species of Jasmine, more than twenty of which have been introduced into Britain; but they may be all easily recognised by their flowers, which bear a strong family likeness to each other, and by the petioles of their leaves, which are always articulated or jointed, that is, they will break off the stem without tearing the bark. In other respects the leaves vary exceedingly in this genus, some being simple and others compound; and some being opposite, as in the common Jasmine, and others alternate, as in *J. revolutum*.

TRIBE II.—OLEINEÆ.

THIS tribe contains numerous genera, among which the most common are the Privet (*Ligustrum*), Phillyrea, the Olive (*Olea*), the Fringetree (*Chionanthus*), the Lilac (*Syringa*), the Ash (*Fraxinus*), and the Flowering or Manna Ash (*Ornus*). All these genera agree in their general character with *Jasminum*, except as regards their seeds, which abound in albumen.

In the common Privet (*Ligustrum vulgare*), the flowers, which are produced in terminal compound racemes, have a very short calyx (see *a* in *fig.* 65), with a funnel-shaped corolla, having a wide tube in proportion to the limb (*b*), which is very short and divided into four segments. The anthers of the stamens and the stigma are seen in the throat of the corolla. The



berry is drupe-like, and generally contains two one-seeded nuts. The leaves are simple and opposite. There are many species of Privet, but the handsomest is *L. lucidum*, the leaves of which are broad and shining, and the panicles of flowers spreading. This tree yields a kind of waxy matter from its leaves and branches when boiled, which is said to be used by the Chinese for candles.

FIG. 65.—FLOWER
OF THE PRIVET.

The Phillyrea is a handsome evergreen shrub, very useful in shrubberies, from its forming a close compact bush of a deep green, which makes a good background to Tree Roses, Almond-trees, *Magnolia conspicua*, or any other flowering plant that would appear naked if its flowers were not relieved by a back-ground of green. The flowers of the Phillyrea are small and of a greenish white. The fruit is a drupe, containing a two-celled stone or nut, but with seldom more than one perfect seed.

The Olive (*Olea sativa*) has small white flowers, resembling those of the Privet, and a fleshy drupe like a Sloe, with a one or two celled stone or nut. The oil is contained in the fleshy part of the fruit, and the best oil is that which is obtained by crushing the pulp of the fruit without breaking the stone or nut.

The Fringe-tree (*Chionanthus virginica*) differs from the preceding genera in the length of the segments of the limb of its corolla, which is cut into long slender shreds like fringe. In all other respects except that the pulp of the fruit does not contain oil, this genus is closely allied to the Olive.

The common Lilac (*Syringa vulgaris*) has its flowers disposed in a kind of paniced raceme called a thyrsus. The calyx is very small, and obscurely four-toothed (see *a* in *fig.* 66), and

the corolla (*b*) is funnel-shaped, with a four-parted limb; the stigma is two-cleft, and both the style and stamens are enclosed in the tube



FIG. 66.—FLOWER AND SEED-PODS OF THE LILAC.

of the corolla. The fruit is a dry two-celled and two-seeded capsule, which opens with two valves, as shown at *c*, each valve having a narrow dissepiment down the middle: the shape of the seed is shown at *d*. The leaves are simple, opposite, and entire; and the branches are filled with pith, which may easily be taken out and the branch left hollow like a pipe; and hence the generic name of *Syringa*, from *Syrinx* a pipe.

The Ash (*Fraxinus excelsior*) differs so much from the other genera as to seem scarcely to belong to the same order. The flowers are without any petals, and frequently without any calyx; and some of them, which are called the female flowers, have no stamens, while others, which are called the males, have no pistil. Some of them, however, have both stamens and pistil.

The fruit is what is called a samara or key; that is, it is furnished with a membrane-like wing so as to resemble a dry leaf. It is two-celled, but very frequently only one-seeded. The shape of the keys, and the manner in which they grow, is shown at *a* in *fig. 67*; and the leaves, at *b*. The leaves are opposite and generally pinnate, with five or six pairs of leaflets; but there is one species with simple leaves (*Fr. simplicifolia*).



FIG. 67.—AMERICAN ASH (*Fraxinus americana*).

The Weeping Ash

is only an accidental variety of the common kind. The leaves of the Ash come out late and fall early; but the tree may easily be recognised when quite bare by the greyness of its bark and its black buds. It will grow in any soil; but it is injurious to arable land, from its roots spreading widely near the surface.

The Manna, or flowering Ash, (*Ornus europæus*), differs widely from the common Ash in its flowers, which are white, with a corolla divided into four long narrow segments. The two stamens have long filaments, with a small pistil (*c*), the stigma of which is notched. The

flowers are produced in great profusion in loose panicles, and they are very ornamental, the samaras and leaves closely resembling those of the common ash. There are several species of this genus, which were all formerly included in the genus *Fraxinus*. The Manna is the sap of the tree, and it is procured by wounding the bark.

CHAPTER IX.

THE ORDER SOLANACEÆ: ILLUSTRATED BY THE BITTER-SWEET; GARDEN NIGHTSHADE; POTATO; EGG-PLANT; TOMATO; CAPSICUM; WINTER CHERRY; CAPE GOOSEBERRY; THE DEADLY NIGHTSHADE; LYCIUM, OR DUKE OF ARGYLE'S TEA-TREE; CESTRUM; VESTIA; TOBACCO; PETUNIA; NIEREMBERGIA; SALPIGLOSSIS; SCHIZANTHUS; HENBANE; DATURA; BRUGMANSIA; SOLANDRA; VERBASCUM; CELSIA; NOLANA; ETC.

THIS large Order is one of those which appear to have been most troublesome to botanists, as scarcely any two agree as to the plants to be comprised in it. I have, however, taken it in its most comprehensive sense, as far as popular plants are concerned; on the same principles as those by which I have been guided throughout; viz. that it is easier for a beginner to remember a few divisions than a great many; and that when a student has once learnt what plants are nearly allied to each other, and the general features that connect them, it will be comparatively easy to learn the minor distinctions between them.

Taking these principles as my guide, I have given the Order Solanaceæ as it was formed by Jussieu, adding those plants to it which evidently belong to the several sections, but which have

prickly leaves; but the flowers have all such a likeness to each other, as seldom to require to be botanically examined to be recognised.

The Tomato or Love-apple, (*Lycopersicum esculentum*,) has flowers which bear a great resemblance to those of some of the species of *Solanum*, but the anthers open longitudinally and are connected by a membrane into a kind of cylinder. The seeds also are hairy; and the berry is wrinkled, and not of so firm a texture as in *Solanum*. The flowers of this plant are frequently united, so as to appear to have double or treble the usual number of stamens, and two or three styles; and when this is the case, the fruit appears deformed from two or three of the ovaries having grown together. The fruit is very good to eat, and wholesome either boiled or stewed, or as sauce. There are several species, all of which were formerly included in the genus *Solanum*.

The plants belonging to the genus *Capsicum* have flowers which are very much like those of the Tomato, and which have similar anthers; but the fruit differs in being a dry, inflated, hollow berry, inclosing numerous seeds, and in both the seeds and their cover having a fiery biting heat to the taste. There are several species with fruit of greater or less size, and different colours; generally red or

yellow, but sometimes white or green. The best Cayenne pepper is made from the pods of *C. frutescens*, dried in an oven and then reduced to powder. The annual species (*C. annuum*) has many varieties; one of which produces the small pods called by the market-gardeners Chilies, and which are eaten fresh by dyspeptic patients, to assist digestion.

The Winter Cherry (*Physalis Alkekengi*) has the same kind of flower as the other genera of this tribe. The corolla is rotate, and obscurely five-lobed; and the stamens, which are connivent, (that is, lying close together), have very large anthers. When the corolla falls, the calyx becomes inflated, and expands to a large size, completely enclosing the little berry-like fruit in the centre. A very beautiful preparation may be made by soaking this calyx in water till it becomes completely macerated; that is, till all the pulp is decayed and only the fibrous part left. The inflated calyx then appears like a beautiful network covering, with the bright red berry in the centre. To macerate the calyx properly, it should be left in the same water without changing, for about six weeks. The Cape Gooseberry (*P. peruviana*) is another species of the genus *Physalis*; but instead of being a native of Europe, it is from Peru; and its flowers, instead of being white, are yellow, with a dark red spot

at the base of each lobe of the corolla: the berry also is yellow. This species is called Cape Gooseberry, because it is cultivated as a fruit at the Cape of Good Hope.

The Deadly Nightshade (*Atropa Belladonna*)

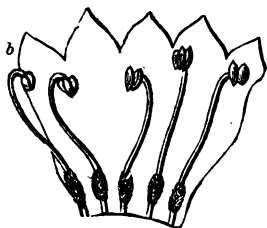


FIG. 69.—DEADLY NIGHTSHADE
(*Atropa Belladonna*).

differs widely from all the preceding genera in having a bell-shaped corolla, (see *a* in *fig.* 69,) and in the anthers (*b*) not lying close together. It has, however, a permanent calyx and a two-celled berry, like the rest.

The Barbary Box-thorn, or Duke of Argyle's Tea-

tree, (*Lycium barbarum*) has a somewhat rotate corolla, with a five-cleft limb, with the stamens inserted between the segments in the same manner as shown in the flower of the *Atropa Belladonna*, represented cut open at *b* in *fig.* 69. The filaments are hairy at the base, and the anthers are near together, but do not form a cone as in *Solanum*. The berry is two-celled, and the calyx remains on when it is ripe, as in all the

other genera of this order. There are several species of *Lycium*, which are all known by the English name of Box-thorn; but *L. barbarum* is also called the Duke of Argyle's Tea-tree, from a story told of this plant being sent to a Duke of Argyle early in the last century, instead of the true Tea-tree. The story, however, is very doubtful; and the more so, as in France, the dwarf Chirfese Elm is called Thé de l'Abbé Gallois, as it is said, from a similar cause.

Cestrum Parqui is a very handsome half-hardy shrub, which may be placed in this division from its berry-like fruit. It has a funnel-shaped corolla, with a five-lobed limb, enclosing its five stamens. The flowers are disposed in an upright raceme; they are yellow, and very fragrant. The berries are of a very dark blue, and almost black when ripe. *Vestia* is another genus very nearly allied to *Cestrum*, but the stamens project beyond the mouth of the corolla instead of being enclosed within it; and the flowers, which are produced singly, have a very disagreeable smell.

TRIBE II.—NICOTIANEÆ.

THE plants included in this tribe agree with those of the preceding division, in having the corolla generally folded in large plaits in the

bud; but they are distinguished by having all capsular fruit: that is, in all the plants belonging to this tribe, the seed-vessel is dry and hard when ripe, and not soft and pulpy like a berry. The species have nearly all funnel-shaped flowers, with a long tube and a spreading limb; the tube is generally very long in proportion to the limb, and it is often inflated, so as to appear much wider in the upper part than near the calyx.

The Virginian Tobacco (*Nicotiana tabacum*) is an example of an inflated tube to the corolla

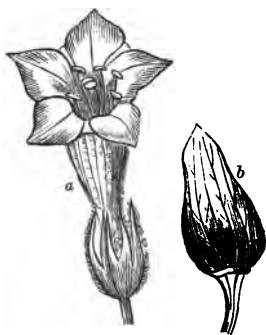


FIG. 70.—VIRGINIAN TOBACCO.

(see fig. 70, a); the limb is small and divided into five pointed segments; and the capsule (b), which opens at the point into four valves when ripe, contains numerous seeds. The whole plant is covered with a clammy down, particularly the leaves, which are large

and flabby, and which have their footstalks dilated at the base, so as partly to enfold the stem. There are many species of *Nicotiana*, some of which are very ornamental. It is the dried leaves that are used as tobacco, or ground into snuff.

The *Petunias* are so well known, that I need say very little of the general form of their flowers, except to point out the connexion between them and the Tobacco. The corolla is salver-shaped, with a cylindrical tube, wider at the top than at the base, and a five-lobed limb. There are five stamens of unequal length, which are hidden in the tube of the corolla. The stigma has a broad head which is slightly two-lobed ; and the calyx remains on the ripe capsule, which is two-celled, and opens in the upper part with two valves. The seeds are numerous and very small, and the leaves are pubescent and slightly clammy. If my readers will take the trouble to compare the *Petunia* and the Tobacco, they will be surprised to find how much the flowers are botanically alike. The differences are, that the calyx is more leaf-like in the *Petunia* than in the Tobacco ; and the corolla of the *Petunia* is somewhat oblique, that is, two of the segments are smaller than the others ; the filaments, also, are thickened at the base. It will appear extraordinary to every one acquainted with the flowers of the purple and the white *Petunias*, to find that some botanists have placed them in different genera. Such, however, is the case. On cutting open the delicate little seed of the white *Petunia* (*P. nyctaginiflora*), which it must have been very difficult to do, and ex-

amining it in a very powerful microscope, the embryo or germ of the future plant was found to be curved like that of most of the other Solanaceæ; whereas when the seed of the purple Petunia (*P. phænicea* or *violacea*) was examined in the same manner, the embryo was discovered to be straight. This purple Petunia has consequently puzzled botanists as much as some of the other plants I have had occasion to mention; and it has been called successively *Petunia violacea*, *Salpiglossis integrifolia*, *Nierembergia phænicea*, and *Petunia phænicea*.

Nierembergia is a genus of ornamental greenhouse plants, easily distinguished from the Petunias by the great length of the tube of the corolla, and by the equal segments of the limb. The stamens also project beyond the flower, being inserted in the throat of the corolla, and the filaments grow together at the base; the stigma, is, likewise, curiously dilated into a kind of crescent shape, and it is folded in a very singular manner round the filaments, as if to support the anthers. The most common species of this genus are *N. filicaulis*, *N. calycina*, and *N. gracilis*.

The genus *Salpiglossis* is now confined to one species, *S. sinuata*, so called from its notched or scalloped leaves; all the different kinds being now considered only varieties. The calyx in

this species is five-angled and five-cleft, and the corolla is funnel-shaped, the tube being very narrow near the base, and spreading out wider towards the mouth. The limb is five-cleft, and there are five stamens, one being much smaller than the others. The stigma is transverse, with a channel through the centre.

Schizanthus is another genus nearly allied to the last, but it is more difficult to give a just idea of it than of any other that I have attempted to describe. All the parts of the flower are irregular. The segments of the calyx are uneven; and the limb of the corolla is cut into a number of irregular lobes. There are only two perfect stamens, but there are two other small ones without any pollen in their anthers, and the rudiments of a fifth. The two perfect stamens are very elastic, springing upwards and discharging their pollen at the slightest touch. The capsule is two-celled, the valves opening at top; and the leaves are bi-pinnatifid.

The genera *Salpiglossis* and *Schizanthus* have been removed by Dr. Lindley from Solanaceæ, and placed by him in the allied order Scrophulariaceæ, or the Foxglove family.

The Henbane (*Hyoscyamus niger*) has the calyx ventricose at the base, and the corolla campanulately funnel-shaped; the limb is five-cleft, and one of the segments is larger than the

rest ; but the most remarkable part of this plant is the capsule. When the corolla falls, the capsule shrouded in the calyx presents the appearance shown at *a* in *fig. 71* ; and as the seeds ripen, the upper part (as shown at *b*) becomes detached, and opens like a little cap. The leaves are sinuated and semi-decurrent. There are several species of Henbane, one of which (*H. aurea*) has the limb of the corolla deeply cut on only one side.



FIG. 71.—HENBANE.

The genus *Datura* is nearly allied to *Brugmansia*, but it may be easily distinguished by its calyx, which divides when the ovary begins to swell, and the upper part drops off, leaving only the lower part to enfold the capsule. The corolla of all the species of *Datura* is funnel-shaped, and the limb, in the large-flowered kinds, often shows marks of the plaits in which it lay when it was folded in the bud. There are five distinct stamens, which are generally enclosed in the mouth of the corolla. The capsule is fleshy when young, and in most of the species it

is covered with spines. This is the case with *D. Stramonium* (the common Thorn-apple), *D. Tatula*, and *D. Metel*, all of which have also their stamens enclosed; but in *D. ceratocaulon* the capsule is smooth and the stamens exserted, that is, they project beyond the tube of the corolla.

The genus *Brugmansia* is distinguished by its calyx being ventricose, and only two or three cleft; it is also strongly ribbed. The corolla is funnel-shaped, the tube being strongly ribbed; and the limb is five-lobed, the lobes being cuspidate, that is, drawn out into abrupt points. The flowers are drooping, and in *Brugmansia suaveolens*, formerly *Datura arborea*, they are very fragrant. The anthers grow together. The capsule is two-celled, smooth, and of a golden yellow, and the seeds are each covered with a thick corky skin. In *Solandra*, a nearly allied genus, the calyx bursts on one side, and the lobes of the corolla are not cuspidate, but rounded and fringed. The stamens also project beyond the mouth of the corolla, and the capsule is four-celled. The species of *Solandra* are all stove-trees.

TRIBE III.—VERBASCINEÆ.

THE plants included in this division differ from those in the preceding ones, in not having

the corolla plaited in the bud, and in having the anthers only one-celled; distinctions which have been thought of sufficient importance to induce many botanists to make this tribe a separate order.

The British plant sometimes called the Shepherd's Club, and sometimes the common Mullein or Flannel flower (*Verbascum Thapsus*), is a familiar example of this genus. In this plant the flower is rotate, or wheel-shaped, and divided into five rather unequal lobes. The calyx is five-cleft; and it possesses such a power of collapsing over the ovary, that when the stem of the plant is struck sharply with a hard substance, every open flower is forced off by the sudden closing of its calyx. There are five stamens, the filaments of which are bearded, and the anthers crescent-shaped; and a capsule, the two cells of which frequently run into one, and which opens by two valves at the apex. The flowers are crowded together in a thick spike-like raceme, which bears no small resemblance to a club. This plant was formerly supposed to be efficacious in driving away evil spirits; and hence it was called Hag's-taper, now corrupted to High-taper. The whole plant is mucilaginous, and a decoction of it is often given to cattle when they are suffering under pulmonary complaints; and hence is derived another

of its names, Cow's Lungwort. The leaves are thick, and woolly on both sides; and they are decurrent, that is, running down the stem, like little wings on each side.

Celsia differs from *Verbascum* botanically in having only four perfect stamens, two of which are shorter than the others. The racemes are also much more loose, from the flowers being on rather long pedicels. Most of the species composing this genus were formerly included in *Verbascum*. *Ramonda* is another genus, which consists only of the *Verbascum Myconi* of Linnæus.

TRIBE IV.—NOLANEÆ.

THIS tribe, which is now made a distinct order by Dr. Lindley, is principally known by the genus *Nolana*; the species of which are annual plants, natives of Chili and Peru, which have lately been much cultivated in British gardens. The flowers of *Nolana atriplicifolia*, one of the commonest kinds, very much resemble those of the common *Convolvulus tricolor*, and the leaves are large and juicy like those of spinach. On opening the corolla there will be found to be five stamens, surrounding four or five ovaries, which are crowded together on a fleshy ring-like disk. These ovaries, when ripe, become as many drupes, enclosing each a three

or four celled nut or bony putamen, which is marked with three or more grooves on the outside, and has three or more little holes beneath. All the species of *Nolana* have the same peculiarities in their seed-vessels, though they differ in many other respects. In the same tribe or order are included two other genera, one of which, called *Grabowskia*, contains only the singular shrub formerly called *Lycium boerhaviaefolium*, or *Ehretia halimifolia*, the nuts of which resemble those of the Coffee.

Besides the plants contained in these four tribes, there are several other genera which some botanists place in *Solanaceæ*, and others in *Scrophularinææ*; and among these may be mentioned *Franciscea*, *Browallia*, and *Anthocercis*. In the former of these genera the flowers are small, the corolla is salver-shaped, and the calyx, which is permanent, is inflated and smooth. In *Browallia*, the calyx is strongly ten-ribbed, and the corolla has an oblique limb; and in both genera there are only four stamens, two of which are longer than the others. In *Anthocercis* there are four perfect stamens and the rudiments of a fifth. The corolla is not folded in the bud, but has a regular, star-like limb.

CHAPTER X.

THE ORDER URTICACEÆ : ILLUSTRATED BY THE COMMON NETTLE ; THE HOP ; THE HEMP ; THE PELLITORY OF THE WALL ; THE BREAD-FRUIT TREE ; THE JACK-TREE ; THE COW-TREE OR PALO DE VACCA ; THE UPAS OR POISON-TREE OF JAVA ; THE MULBERRY ; THE PAPER MULBERRY ; THE OSAGE ORANGE, OR MACLURA ; THE COMMON FIG ; FICUS SYCAMORUS ; THE BAN-YAN TREE ; THE INDIAN-RUBBER TREE ; AND FICUS RELIGIOSA.

THIS very large order is divided into two distinct tribes, which many botanists make separate orders ; the one embracing the herbaceous species with watery juice, and the other the ligneous species, all of which have their juice milky. The botanical construction of the flowers is, however, strikingly alike in all, from the nettle and the humble pellitory of the wall, to the fig and bread-fruit tree. In all the genera, the male and female flowers are distinct, that is to say, some of the flowers have only stamens, and the others only a pistil ; the latter, of course, being the only ones that produce seed. None of the flowers have any corolla ; and in all the male flowers, the stamens, which are erect at first, spring back with elasticity to discharge their pollen, and afterwards remain extended. The seeds of all are enclosed in nuts : though the eatable part varies, being in some

the dilated receptacle, as in the Bread-fruit and the Fig, and in others the metamorphosed calyx, as in the Mulberry. Many of the genera have one or two species which produce eatable fruit, though the fruit of the other species of the same genus is unwholesome; an anomaly rarely to be met with in any other order except Solanaceæ; and though the milky juice of most of the plants is poisonous, it affords in one species, the Cow-tree, wholesome food.

TRIBE I.—URTICACEÆ.

ALL the plants contained in this tribe agree with the common Nettle in yielding a watery juice when broken; in their flowers having no corolla; in the male and female flowers being distinct; in the stamens being first erect, but springing back when they discharge their pollen, and remaining extended; and in their fruit being a nut. Most of them also agree in having rough leaves and angular stalks, the fibres of which are so tenacious as to be capable of being spun.

The common Nettle (*Urtica dioica*) is the type of this division; and we are so accustomed to consider it a noxious weed, that few persons are aware of the elegance of its flowers, which are disposed in drooping panicles. The male

flowers have their calyx divided into four sepals ; and they have four stamens, the anthers of which open with elasticity, and when they spring back, the pollen, which is very abundant, is discharged with such force that it may be seen on a fine day in summer rising like a mist or light cloud over the plants. The stamens, after they have discharged their pollen, lie extended and curved back over the segments of the calyx, as shown at *a* in *fig.* 72. The female flowers have only two segments to the calyx. They have no style, and the stigma, when highly magnified, will be found divided into numerous segments, as shown at *b* ; the seed-vessel is a nut, which has a shell and kernel, the latter being the seed. The leaves are simple, cordate, opposite to each other, and furnished with stipules. They are rough on the surface, and covered with glandular hairs or stings. These hairs are hollow, with a cell at the base filled with a peculiarly acrid liquid, and tapering upwards so as to form a narrow tube, ending in a sharp point. When the point of the sting enters the skin, the pressure compresses the cell at its base, and the liquid it contains is forced up the tube and injected into the wound. The



FIG. 72.—NETTLE
(*Urtica dioica*).

stem is quadrangular, and its fibres are so tough, that when separated from the pulp by maceration, they may be spun into yarn. The young shoots when boiled are very good to eat. The Roman Nettle (*U. pilulifera*) differs from the common kind in having the male flowers in loose panicles, and the female ones in compact pill-like heads, whence the specific name. The sting of this nettle is worse than that of the common kind.

The Hop (*Humulus Lupulus*) is a very interesting plant to a botanist, from the peculiarity of its flowers. The male and female ones are distinct, and generally on different plants. The

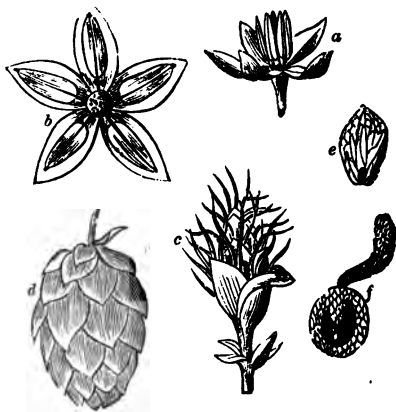


FIG. 73.—Hop (*Humulus Lupulus*).

male flowers are produced in loose panicles; the calyx (*fig. 73, a*) consists of five sepals, in

the centre of which are five stamens, standing at first erect, but springing back with elasticity, when they discharge their pollen, and remaining extended as shown at *b*. The anthers open by pores at the extremity of the cells, as in *Eri-caceæ*. The female flowers are produced in close heads (*c*). They have neither calyx nor corolla, but the ovary of each is protected by a membranous scale. Each ovary has two styles, though it produces only a single seed. As the fruit ripens the styles disappear, and the scales enlarge, so as to give the head of female flowers the form of a strobile or cone (*d*), the ripe fruit or nut being placed at the base of each scale, as shown at *e*. The surface of the scales is studded over with roundish glands, which are filled with a substance resembling pollen, called lupuline, which they give out on pressure, as shown at *f*; and this substance consists of a number of cells filled with volatile oil, which occasion the fragrance of the hop, and contain the bitter and astringent principles which make the hop so useful in compounding malt liquor. The lupuline is also somewhat narcotic; but though the fragrance of hops is said to produce sleep when inhaled in small quantities, an excess of it produces headache and vertigo, especially in nervous persons. The leaves are opposite, and three or five lobed;

they are serrated on the edges, and rough on the surface. The stems are angular, covered with small prickles, and twining from left to right. The fibres of the stem when separated by soaking in water, are found to possess the same kind of tenacity as those of the Nettle and the Hemp, and may be made into cloth. The young shoots when boiled, are very good to eat as a substitute for asparagus. The leaves are furnished with stipules, and the flowers spring from the axils of the leaves.

The Hemp (*Cannabis sativa*), is an annual. The male and female flowers are on different plants as in the Hop and the Nettle. The male flowers are produced in panicles, and the female ones in heads separated by bracts, as shown in a magnified female flower at *a* in *fig. 74*. The

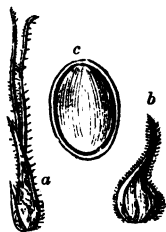


FIG. 74.—HEMP.
(*Cannabis sativa*.)

ripe fruit or nut is enveloped in a scale as shown at *b*; and *c* is a highly magnified section of the nut. The male flower has five stamens, and a calyx of five sepals. The leaves are opposite or alternate, and digitate, that is cut into five long segments like fingers, though the upper leaves have only three segments. They are serrated on the margin, and rough on the surface. The fibres of the

stem, when separated from the pulpy part by maceration, are manufactured into cordage; and the seeds are mucilaginous, and are used for feeding birds. The smell of hemp when growing, produces the same effects as that of hops in excess; and in hot countries it is followed by a kind of stupor, like that which is the effect of opium.

The Pellitory of the wall (*Parietaria officinalis*), has the male and female flowers on the same plant. The male flowers have four stamens, which spring back in the same manner as those of the nettle; and the female flowers have the same kind of stigma.

TRIBE II.—ARTOCARPÆ.

THE plants included in this division differ so widely in their general appearance from those of the former tribe, that it is necessary to be a botanist to perceive the resemblance between them. When, however, they are botanically examined, they will be found to agree in almost every respect, except in their juice being milky and glutinous instead of watery. The tribe takes its name from the Bread-fruit tree (*Artocarpus incisa*). In this plant, the male flowers are densely crowded round a spongy receptacle, so as to form a long, somewhat club-shaped cat

kin. Taken singly, each male flower consists of a calyx divided into two sepals, and containing a single stamen, with a two-celled anther, and a very broad filament. The female flowers are placed round a globular receptacle, also of a spongy consistency; and each consists of an undivided calyx, hollow at the base to contain the seed, and terminating in two styles. The styles wither as the seeds gradually ripen, but the peaks of the female flowers remain, and render the surface of the fruit rough. The fruit itself is the spongy receptacle, which gradually dilates and becomes more pulpy, till it attains a very large size. The greater part of the ovules prove abortive, but those that ripen retain their calyx, though they remain embedded in the pulp. The proportion of ripe seeds is very small compared to the size of the eatable part of the bread-fruit; frequently only four or six seeds are found in a globe eight inches in diameter; and many fruits produce no seeds at all. One variety, in particular, is always without seeds. The fruit, when used, is generally put into an oven or before a fire, and when the rind turns black, it is scraped off, and the pulp is found to resemble the crumb of new bread. The seedless fruits are considered the best to eat, and they are known by the smoothness of their outer surface. It adds to the interest ex-

cited by this singular tree, to recollect that the Bounty, rendered so celebrated by the mutiny of Christian, was sent out, under Captain Bligh, to convey a number of plants of this tree from Otaheite to the British settlements in the West Indies; and that there actually were seven hundred and seventy-four plants on board, at the very time the mutiny broke out. The leaves of the Bread-fruit tree are very large, being sometimes two or even three feet long, and a foot and a half broad; they are leathery, and are cut into from three to nine deep lobes. Their colour is a deep green, with yellowish veins. The petioles are short and thick, and there are large stipules which wither and fall off before the leaves. The whole plant abounds in milky juice, which flows abundantly when the leaves or branches are wounded or broken.

The Jack tree (*Artocarpus integrifolia*), bears fruit of an oblong form often seventy or eighty pounds in weight, the pulp of which is seldom eaten; but the seeds, which are abundant, are considered very good, and are said when roasted to have the flavour of sweet chesnuts. The leaves are very thick and leathery, and much smaller than those of the Bread-fruit, being seldom more than six or eight inches long. They are also generally entire, but this is by no means a constant character, notwithstanding

the specific name, as those near the root are sometimes found nearly as deeply lobed as those of *A. incisa*. The Jack tree is a native of the East Indies, particularly of the Molucca Isles, Amboyna, and Ceylon, and it also seems naturalised in the West Indies, particularly in the Island of St. Vincent. The wood resembles that of mahogany.

The Cow tree, or Palo de Vacca (*Galactodendron utile*), appears nearly allied to the Bread-fruit tree, though its flowers are unknown. The nut, however, which is covered with a husk apparently composed of the hardened calyx, resembles those of the other plants belonging to the Urticacæ, and the bark when wounded gives out abundance of milk, which is good to drink. Humboldt in his *Relation Historique*, describes this tree as "growing on the sides of the rocks, its thick roots scarcely penetrating the stony soil, and unmoistened during many months of the year by a drop of rain or dew. But dry and dead as the branches appear," Humboldt continues, "if you pierce the trunk, a sweet and nutritive milk flows forth, which is in the greatest profusion at day-break. At this time the blacks, and other natives of the neighbourhood, hasten from all quarters, furnished with large jugs to catch the milk, which thickens and turns yellow on the surface. Some

drink it on the spot, others carry it home to their children ; and you might fancy you saw the family of a cowherd gathering around him, and receiving from him the produce of his kine." (*Humboldt, as quoted in the Botanical Magazine, vol. 66, t. 3724.*)

The Upas, or Poison tree of Java (*Antiaris toxicaria*), about which so many fabulous stories have been told, belongs to this tribe. The male flowers are gathered together in small heads on a fleshy receptacle, (see *fig. 75 a*;) and each consists of a calyx of four sepals (*b*), bending over four stamens, with long anthers and very short filaments. The female flowers have an undivided fleshy calyx with two styles, and this fleshy covering forms the pericardium of the fruit, which is a drupe. When ripe, the fruit represents a moderately sized plum, inclosing the nut, or stone, which contains the kernel or seed. The poison lies in the milky sap.

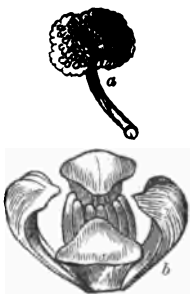


FIG. 75.—UPAS TREE.

The common black Mulberry (*Morus nigra*) has the general features of the order. The male flowers grow together in a dense spike, as shown in *fig. 76 at a*, and each flower consists

of a calyx of four sepals, and four stamens, which spring back and remain extended after



FIG. 76.—MULBERRY.

they have discharged their pollen (*b*). The female flowers also grow closely together, in dense spikes, round a slender receptacle; each having two elongated fringed stigmas (*c*), and a calyx of four sepals, and being inclosed in an involucre, as shown at *d*. As the seeds ripen, each female flower becomes a drupe, consisting of a fleshy and juicy pericardium formed from the calyx, and the nut; and these drupes being pressed closely together by the position of the female flowers, the whole adhere together and form the fruit we call the mulberry. The involucre withers when the calyx becomes juicy; but the remains of it and of the style are often seen on the ripe fruit, as shown at *e*. The receptacle also remains as a sort of core, which is thrown away when the fruit is eaten, though

it does not part from it so freely as in the raspberry; and the little nuts, or seeds as they are called, are found in the centre of each juicy globule. The leaves are simple, entire, and rough on the surface.

The white Mulberry (*Morus alba*) differs from the common kind in the fruit not being eatable; as the calyxes of the female flowers never become juicy. The leaves are, however, much smoother and of finer texture than those of the black mulberry, and they are principally used for feeding silkworms, for which those of the black mulberry are not so good.

The red Mulberry (*M. rubra*) is an American species, with leaves too rough to be good for silkworms, and very indifferent fruit. The Constantinople and Tartarian Mulberries are supposed to be only varieties of *M. alba*, though their fruit is good to eat, and the latter has lobed leaves.

The Paper Mulberry (*Broussonetia papyrifera*) has the male and female flowers on different plants. The male flowers are produced in pendulous catkins, and the calyx has a short tube before it divides into four segments; each flower is also furnished with a bract, but in other respects their construction is the same as that of the other flowers of the order. The female flowers have also a tubular calyx, and

they are disposed in globular heads on rather long peduncles ; but they differ from those of the other genera in having only a single stigma, and in the ovary being inclosed in an integument within the calyx, which becomes juicy as the seeds ripen, and not the calyx itself. The leaves are very irregularly lobed, and hairy ; and the liber or inner bark is used for making what is called Indian paper.

The Osage Orange (*Maclura aurantiaca*), has the male and female flowers on different plants, the male being borne in short close panicles of ten or twelve flowers each, and not differing in construction from those of the other genera. The female flowers are borne on a large globular receptacle, like that of the bread-fruit ; and they resemble those of that plant in construction, except that they are pitcher-shaped instead of being angular, and that they have only one stigma instead of two. The receptacle also never becomes soft and pulpy like that of the bread-fruit, but remains hard and stringy and unfit to eat. The leaves are smooth and of delicate texture, and as they abound in glutinous milk, they have been found very suitable for silkworms. The wood is of a beautiful glossy texture, and very fine and close-grained. The tree is found wild in the country of the Osage Indians, near the Mississippi, and from

the rough surface of its fruit, and its golden-yellow colour, it has received the name of the Osage Orange.

The common Fig (*Ficus Carica*) has its male and female flowers on the same plant, and often within the same receptacle. The receptacle in this plant instead of being surrounded by the flowers, incloses them, and is, in fact, the fruit we call a fig. This receptacle is sometimes roundish, but more generally pear-shaped; and it is not quite closed, but has a little opening or eye at the upper end, which is fitted in with several very small scales. The stalk of the fig is articulated on the branch. The male flowers are generally in the upper part of the fig, and they consist of a half tubular calyx, with a limb divided into three segments, and three stamens. The female flowers have each a calyx of five sepals, and a single style with two stigmas; and they are succeeded by the seeds, or nuts as they are called, as each contains a kernel which is the true seed. The leaves are very small when they first expand, but they gradually increase in size, till they become very large. They are generally lobed, and their petioles are articulated. The figs are produced in the axils of the leaves. It may be observed here, that Du Hamel mentions that the receptacle is not closed in all the varieties of the fig, but that in some it opens naturally, when

the seeds are ripe, dividing at the orifice into four equal parts, like the valves of a capsule ; and even when this is not the case, the figs, when the receptacle becomes pulpy and soft from ripeness, crack and burst at the sides, so as to allow of the escape of the seeds.

As the fig is not fit to eat till the seeds are ripe, various expedients have been devised to transmit the pollen from the male flowers which lie near the opening or eye, to the female flowers which lie nearer the stalk. In Italy this is called caprification, and is done by insects ; but in the neighbourhood of Paris, a very small quantity of oil is dropped on the eye of the fruit as soon as it has nearly attained its full size.

There are several species of *Ficus*, though none of them will bear the open air in England except the common kind ; and only two produce eatable fruit ; viz., *F. Carica*, and *F. Sycamorus*, —the Sycamore tree of Holy Writ, which produces its small roundish fruit in clusters on the trunk and old branches, and not on the young wood, as is always the case with the common fig.

The other most remarkable species are the Banyan tree (*F. indica*), the figs of which grow in pairs, and are about the size and colour of a cherry ; and the branches of which send down roots, which soon become equal in size to the

parent trunk, so that one tree soon becomes like a small forest; the Indian-rubber tree (*F. elastica*), the milky juice of which hardens into Caoutchouc, though this substance is also produced by other trees, particularly by the Brazilian tree *Siphonia elastica*; and the Pippul tree (*F. religiosa*). The leaves of this last tree are used in India for feeding silkworms, and it is said that this is one cause of the strong and wiry nature of the Indian silk; and the insect (*Coccus ficus*) feeds upon it and *F. elastica*, which produces the substance called lac, of which sealing-wax is made. This species takes its specific name of *religiosa*, from the legend that the Hindoo god Vishnoo was born under its branches.

CHAPTER XI.

THE CATKIN-BEARING TREES : ILLUSTRATED BY THE WALNUT, THE HICKORY, THE WILLOW, THE POPLAR, THE ALDER, THE BIRCH, THE OAK, THE BEECH, THE SWEET CHESTNUT, THE HAZEL, THE HORNBEAM, THE HOP HORNBEAM, THE PLANE TREES, THE LIQUIDAMBAR, MYRICA, COMPTONIA, CASUARINA, AND *Garrya elliptica*.

THE plants contained in this chapter are placed by modern botanists in six or seven different orders ; but I have been induced to group them together, both because they follow each other in regular succession, and because there is a certain degree of general resemblance which connects them together, and renders it easier to retain their names when linked together by the association of ideas, than it would have been if they had been each described separately.

The first order of catkin-bearing trees that I shall describe is called Juglandaceæ, and it contains three genera, only two of which, the Walnuts and the Hickories, are common in British gardens. The second order, Salicaceæ, contains also two genera, the Willows and the Poplars ; the third, Betulaceæ, contains both the Alders and the Birch trees ; the fourth,

Corylaceæ or Cupuliferæ, contains the Oak, the Beech, the sweet Chestnut, the Hazel, and the Hornbeam; the fifth, Platanaceæ, is generally considered to include two genera; viz., *Platanus* and *Liquidambar*, though this last is, by some botanists, placed in a separate order called *Balsamaceæ*; and the sixth, *Myricaceæ*, or the sweet Gale family. All the genera included in these orders, with the exception of those belonging to *Juglandaceæ*, were formerly comprised in one order, which was called *Amentaceæ*; from the word *Amentum*, which signifies a catkin. The seventh and last order I have mentioned in this chapter is called *Garryaceæ*, and consists of one single genus, *Garrya*, only lately known in Europe. Of all these orders the largest and most important is *Cupuliferæ*, as it includes, among other valuable trees, the Oak and the Beech. All the plants mentioned in this chapter have their male and female flowers distinct, many of the genera having them on different plants; and the male flowers are always in catkins, generally long and cylindrical, but sometimes round and ball-shaped. The female flowers are sometimes in catkins also, but sometimes they are produced singly or in pairs. The flowers of both kinds are without petals, or with such as are inconspicuous; and sometimes without even a calyx, but they are always fur-

nished with bracts, which grow so closely to the flower as almost to seem a part of it. The ovaries are generally two-celled, but they rarely remain so, as they become one-celled before the seed is ripe. The style is, in most cases, very short, and the stigma generally two-lobed. The leaves are always alternate, and generally simple, except in the case of the Juglandaceæ. They are all hardy trees and shrubs.

JUGLANDACEÆ.—THE WALNUT TRIBE.

THE genera belonging to this order have compound leaves, and the male flowers in long cylindrical catkins; the male and female flowers being on the same plant.

THE GENUS JUGLANS.

This genus consists of only three species: the common Walnut (*J. regia*); the black Walnut (*J. nigra*); and the Butternut (*J. cinerea* or *cathartica*). The male and female flowers are distinct, but on the same plant: the male flowers being produced in long, solitary, cylindrical catkins, and the female ones in pairs, or in shorter catkins. The leaves are pinnate, with the leaflets not always opposite, which is very rarely the case in other plants. In *Juglans regia* (the common walnut), the male flowers are produced in a very thick catkin, each flower consisting of

a calyx divided into five or six scale-like lobes, and generally from twelve to twenty stamens, with very long anthers and very short filaments; there is also a very curious bract to each, as shown in the magnified flower at *a* in *fig.*

77; in which the anthers are seen at *b*. The female flowers are in pairs, as shown at *c*; and they con-



FIG. 77.—WALNUT (*Juglans regia*).

sist of a calyx, *d*, enclosing the ovary, and toothed in the upper part, and four small petals encircling two large thick leafy-looking stigmas, *e*.

The fruit is a fleshy husk in one piece, formed of the dilated calyx; it generally retains the stigmas till it has nearly attained its full size, and when it becomes ripe it does not separate into valves, but bursts irregularly. The nut, on the contrary, is in two distinct valves, which may be easily separated from each other; and it is imperfectly divided into cells by four half dissepiments. The germ of the future plant is what children call the heart, and it is in the upper part of the kernel, with the root end uppermost, so that when a walnut is sown the sharp end should be placed downwards. The kernel is four-lobed, and deeply wrinkled; and

when the young plant begins to grow, it divides into two cotyledons or seed-leaves, which drop off when the true leaves are fully developed. The kernel is covered with a thick skin, which is very astringent; and the nut is covered with a membranaceous network of strong veins, which are generally found in a withered state on opening the ripe husk, having left their impression deeply imprinted on the outside of the shell of the walnut. The leaves are impari-pinnate, consisting of four pairs of leaflets and a terminal single one; the lower pair of leaflets is much the smallest, and the other leaflets are frequently not opposite; and they are sometimes unequal at the base. The main petiole is dilated at the point where it joins the stem; and the leaves are placed alternately. The tree is large and widely spreading; and the timber is of a close grain, and takes a fine polish.

The Black Walnut (*J. nigra*) differs from the common kind, in the male flowers being on a smaller and more slender catkin, and furnished with a brown roundish bract at the back of the calyx. The female flowers are also in a sort of catkin, and four or five together. The fruit (see *a* in *fig. 78*) is round, and the husk very thick



FIG. 78.—LEAF AND FRUIT
OF THE BLACK WALNUT
(*Juglans nigra*).

at first, but it gradually wastes away, when the seed is ripe, instead of opening. The leaves have seven or more pairs of leaflets, which are generally nearly opposite, and sometimes they are without the terminal single leaflet, as shown at *b*. The shell of the nut is very hard, and the dissepiments, which are also very hard, are generally perfect, and divide the kernel into four parts. The nuts should be sown as soon as possible after they are ripe, as they will not keep good above six months. The tree grows above seventy feet high, and the wood is very hard and black.

The Butter-nut (*J. cathartica*) resembles the Common Walnut in its male catkins, except that they are produced upon the old wood instead of being on the wood of the present year. The female flowers grow four or five together in a short catkin, and they are distinguished by their stigmas, which are rose-coloured. The fruit (*a* in *fig.* 79) is pear-shaped, ending in a rather long point; and the kernel of the nut (*b*) resembles that of the Common Walnut, except in being more oily. The leaves (*c*) are like those of the Black Walnut, except that the leaflets are rather downy, and



FIG. 79.—BUTTER-NUT
(*Juglans cathartica*).

that there is a terminal one. The calyx of the female flower is also covered with a viscid down, which remains on the husk of the ripe fruit; and the shell of the nut is very hard and very much furrowed. The tree is of much smaller size than that of the Black Walnut, and it may be easily distinguished by the greyness of the bark of its young shoots; it also comes into leaf earlier, and the nuts are ripe about a fortnight sooner than the others. The wood is light, of a reddish colour, and rather a coarse grain.

THE GENUS CARYA.

THE genus *Carya* (the Hickory) consists of ten or twelve species, which greatly resemble



FIG. 80.—THICK-SHELL BARK
HICKORY (*Carya lacinosa*).

the Walnuts in their general appearance, but are distinguished by the male catkins, instead of being solitary, being produced in tufts or bunches, three or more on each peduncle. The stigma is also frequently four-lobed, and the husk, when ripe, divides into

four equal valves, which in some of the species are very thick, as in the Thick-shell bark Hickory (see *a* in *fig. 80*). The nut (*b*) is not valved, and it

is either not furrowed, or very slightly so; but it has four angles which are more or less distinct in the different species: the shell and the dissepiments are both very hard, and the latter, as in the Mocker nut, are sometimes entire, so as to render it very difficult to extract the kernel. The leaves (c) resemble those of the walnut; but they are generally of a thinner texture, and somewhat downy, the down being disposed in little tufts, as may be seen by a microscope. The trees vary much in size, but all of them have a reticulated bark. The wood is of a coarse grain, and will not polish; but it is very strong, and so remarkably tough that it is hardly possible to break it.

There is only one other genus in the order Juglandaceæ, and that consists of only a single species, *Pterocarya caucasica*. It has pinnate leaves of nineteen leaflets each, placed as closely as possible together; and the fruit, (that is, the husk,) is spread out on each side into a thin membrane or wing. This plant is sometimes called *Juglans fraxinifolia*.

SALICACEÆ.—THE WILLOW TRIBE.

THE plants contained in this order have simple leaves, and the male and female flowers

on different plants, both in upright cylindrical catkins.

THE GENUS SALIX.

THE genus *Salix* (the Willow) contains perhaps more species than any other, above two hundred and fifty having been named and described, besides innumerable varieties. The plants included in the genus may, however, be all divided into three kinds—viz. the true Willows, which have thin green leaves, and which include all the tree species, most of which have brittle branches; the Osiers, the leaves of which resemble those of the Willows, but which are low shrubs with very tough branches; and the Sallows, the leaves of which are thick and woolly or shaggy. The Osiers and the true Willows are often confounded together; particularly when the former take, as they sometimes do, a tree-like character; but the Sallows are always perfectly distinct. The rods of the Osiers are used in basket-making.

All the species of the genus have their male and female flowers on different plants, both kinds of flowers being placed on short catkins which are either erect or spreading sideways. The male flowers have each from one to five or more stamens, with no petals or calyx, but as a substitute a bract or scale, which is entire and hairy, and which has one or more glands at its

base. The female flower has a similar bract or scale, and it is also without either petals or calyx; there are two stigmas, each of which is sometimes two-lobed. The capsule has only one cell, but many seeds which are covered with down or longish hairs, and which are very conspicuous from the capsule opening naturally into two valves when ripe. The leaves of the Osiers and Willows are generally lanceolate, and serrated at the margin, and they are always furnished with stipules; but the leaves of the Sallows are generally much broader, and sometimes roundish; and they are always of a thick velvety texture. Though the number of the stamens varies in the different species, two are by far the most common.

Fig. 81 shows the female flower of *Salix fragilis* at *a*, *b* is the honey gland, *c* the stigma, which is divided into four equal parts, and *d* the bract or scale with its hairy fringe; *e* is the male flower with its two stamens, two glands, and hairy scale. This species is a tall, bushy-headed tree, with the branches crossing each other frequently, being set on obliquely; and it is called the Crack Willow, from the young branches separating from the trunk in spring with the slightest blow or jerk, their

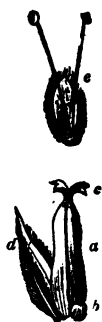


FIG. 81.—THE
WILLOW
(*Salix*).

bases being as brittle as glass. The leaves are of a deep green. The White Willow (*Salix alba*) differs from the preceding species in the branches being widely spreading and somewhat drooping, the old bark cracked into deep fissures, and the foliage of a silvery grey, owing to the silky hairs with which the leaves are more or less covered. The wood of the Tree Willows is soft and white, and very elastic; it is therefore used for cricket-bats, mallets, and other purposes where wood is wanted to resist a hard blow. *S. vitellina*, the Golden Osier, is so called from its golden-coloured bark; and *S. purpurea*, the Purple Willow, is so called from the colour of its branches. This last species has only one stamen; but as the anther is four-celled, it is probably two stamens grown together. All the species that have only one stamen have a four-celled anther, as for example the Rose Willow (*S. Helix*), which has the female catkins red. *Salix caprea*, the great round-leaved Sallow or Palm Willow, is perhaps the handsomest species, from the great abundance and golden hue of its flowers.

THE GENUS POPULUS.

THE genus *Populus* (the Poplar) is distinguished from *Salix* by the bracts of the flowers being deeply cut instead of being entire; by both the male and female flowers having a calyx;

and by the male flowers never having less than eight stamens. The leaf-buds are also covered with numerous scales. *Fig. 82, a*, shows the

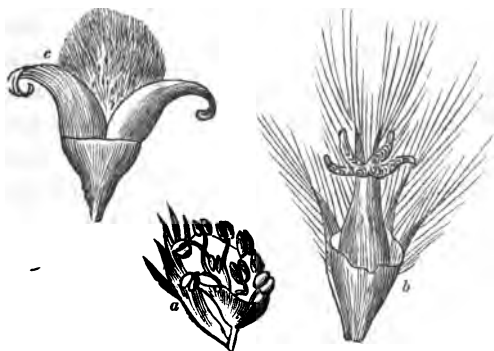


FIG. 82.—TREMBLING POPLAR OR ASPEN (*Populus tremula*).

stamens of the Trembling Poplar or Aspen (*Populus tremula*) shrouded in their cup-like calyx, and with their laciniated bract; *b* shows the female flower with its four stigmas and deeply-cut bract; and *c*, the pod with its valves curling back, so as to show the downy covering of the seeds. All these parts are magnified to show them distinctly, as they are nearly the same in all the species. The following are the distinctions between the principal species. In the White Poplar, or Abele-tree (*P. alba*), the leaves are lobed, and covered with a white down on the under side. In *P. canescens*, the Grey

Poplar, the leaves are also downy beneath; but they are roundish, and the female flower has eight stigmas instead of four. The Aspen (*P. tremula*) has four stigmas, with two leafy appendages at the base, which look like two other stigmas; and the petioles of the leaves, which are very long, are flattened, and so attached to the stem as to be twisted by the weight of the leaf when acted upon by the wind, which gives them their tremulous motion: these leaves are smooth on both sides. All these species have spreading roots, and send up a great many suckers; and their wood is used for butchers' trays, pattens, bowls, milk-pails, and various other purposes. *Populus nigra*, the Black English Poplar, on the contrary, does not send up suckers, and its wood is of very little use; it is, however, very ornamental from the large size and great number of its male catkins, and the bracts of the flowers being of a brownish red, which gives them, when fallen, the appearance of the large brownish-red caterpillars of the Goat-moth.* The Black Italian Poplar (*P. monilifera*) is remarkable for the quickness of its growth. The capsules of the female trees contain such a quantity of down attached to the seeds, as to render it quite unpleasant to walk under them when they are ripe. The Lombardy Poplar (*P. fastigiata* or *dilatata*) is remarkable

for its upright and close habit of growth ; its leaves also are very peculiar in their shape, being broad at the base and then tapering suddenly to a point. The seeds resemble those of the Black Italian Poplar in the quantity of wool which they produce, but luckily the female plants are extremely rare. There are many other species, the most remarkable of which are the Carolina Poplar (*P. angulata*), known by its square stem and very large leaves ; the Balsam Poplar, or Tacamahac tree (*P. balsamifera*), the buds of which are covered with a resinous fragrant substance, and the leaves are of a pale yellowish green, appearing very early in spring ; and the Ontario Poplar (*P. candicans*), which resembles the balsam Poplar, except in its leaves, which are very large and whitish on the under surface, and in the great rapidity of its growth, while that of the Balsam Poplar is rather slow.

BETULACEÆ.—THE BIRCH TRIBE.

THE plants included in this tribe have single leaves, which are generally what is called feather-nerved ; that is, the veins are marked strongly and deeply from the mid rib to the margin. The flowers are in cylindrical catkins, the male and female flowers being on the same plant.

THE GENUS BETULA.

THE common Birch (*Betula alba*) is an exceedingly graceful tree. The male catkins are produced singly, or two or three together. They are long, slender, loose, and gracefully drooping; (see *fig. 83*;) and each consists of a great number of flowers, pressed close together, and growing round a rachis or stem, as shown in the catkin *a* in *fig. 84*, from which some of the flowers have been removed. The male flowers have each ten or twelve stamens enclosed in three or more scales or bracts, as shown in a reversed flower at *b*. The female flowers are produced in dense catkins, which are much shorter than the others, and always solitary; the flowers, which are arranged round a very slender axis, are furnished with lobed scales, and *c* is a scale with three female



FIG. 83.—CATKINS OF THE BIRCH.

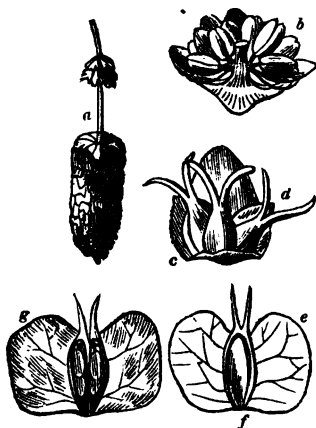


FIG. 84.—THE BIRCH (*Betula*).

flowers in its lobes, each having two long spreading stigmas (*d*). A ripe capsule is shown at *e*, with its membranaceous wings, and the cell, open to show the seed. The ovary when young has two cells and two ovules (as shown at *g*); but the division between the cells wastes away as the seeds ripen, and one of the ovules proves abortive. There are several species of Birch natives of America, some of which have upright oval female catkins like those of the Alder, but they are always distinguished by being solitary.

The bark of the Birch is remarkable for its tenacity, and for the great length of time that it will resist decay. In America they make canoes of the bark of *B. papyracea*; and in Lapland huts are thatched with that of *B. alba*. The Birch is remarkably hardy; and it grows nearer the limits of perpetual snow both on mountains and near the pole than any other tree.

THE GENUS ALNUS.

THE Common Alder (*Alnus glutinosa*), though so nearly allied to the Birch botanically, differs widely in its habits; as it always grows in low marshy situations, or near water, while the Birch prefers the summits of the loftiest hills. In the Alder, the male catkins are long and drooping, like those of the Birch; but they are generally produced in clusters of three or more

together. The male flowers are furnished with three lobed bracts or scales, each containing three flowers, each flower having a calyx of four scales united at the base, and bearing four stamens. The female flowers are in close ovate catkins, produced in clusters of four or five together, instead of being cylindrical and solitary, as in the Birch; the scales of the catkins, though three-lobed, are only two-flowered, and the flowers have two long stigmas like those of the Birch. The ovary has two cells and two ovules, but it only produces one seed. The ripe fruit is a nut without wings, attached at the base to the scale of the cone-like catkin, the scales of the catkin becoming rigid, and opening, like those of the Scotch Pine, as the seed ripens. There are several species of Alder, some of which bear considerable resemblance to the American species of Birch; but they are easily distinguished by the female catkins of the Birch being always solitary, while those of the Alder are produced in clusters, and by the capsules of the Alder being without wings.

CUPULIFERÆ—THE CUP-BEARING TREES.

THIS order includes six genera of very important trees; all of which have their ripe fruit shrouded in a cup-like involucre, which they

retain till ripe. The male and female flowers are on the same plant.

THE GENUS QUERCUS.

THE fruit of all the species of Oak is an acorn, which is only partly covered by a scaly involucre called the cup. The shape of the acorn, and the height to which it is covered by the cup, differ in the different species; but the general character of both is always the same.

The male catkins of the common British Oak (*Quercus Robur pedunculata*) are long and very few flowered; the flowers being small and very far apart. The flowers themselves have six or eight stamens and as many feathery bracts, which are united at the base. The female flowers (*a* in *fig. 85*) are produced on a long stalk at a distance from each other, and each consists of an ovary closely covered with a toothed calyx, as shown in the highly-magnified flower at *c*, and an involucre of several bracts or scales, *d*; the style is short and thick, and the stigma (*e*) is three-lobed. As the fruit ripens, the style and stigma wither away, and the seed remains

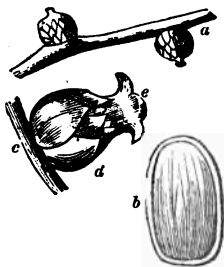


FIG. 85.—THE OAK.

covered by the adnate calyx (*b*), which has become hard and shining. There is a circular



FIG. 86.—GERMINATION OF THE ACORN.

mark or scar at the bottom of the acorn when taken out of its cup, which is called the hilum; and when the acorn is planted, this part should be kept upwards, as the foramen or part where the germ lies is at the other end. When the acorn begins to germinate, it opens at the foramen, cracking a little about half-way down, but not dividing entirely (see *fig.* 86). The root (*a*) then begins to protrude, and soon after the plumule, or young shoot (*b*), the leaves of which gradually unfold themselves. A curious experiment may be tried by suspending an acorn in a glass of water, or by placing it in one of those glasses with a wide mouth and a narrow neck, used for nosegays; when, if kept in a sitting-room, the acorn will gradually open, and the root and leaves develop themselves; and thus may be watched the first beginning of the monarch of the forest, the progress of which is so strikingly

depicted in the beautiful lines adapted by Cowper to the hollow trunk of a gigantic oak in Yardley Chase near Castle Ashby:—

Thou wert a bauble once, a cup and ball
Which babes might play with ; and the thievish jay,
Seeking her food, with ease might have purloin'd
The auburn nut that held thee, swallowing down
Thy yet close folded latitude of boughs,
And all thy embryo vastness, at a gulp.

• • • • •

Time made thee what thou wert—King of the Woods !
And time hath made thee what thou art—a cave
For owls to roost in ! Once thy spreading boughs
O'erhung the champaign, and the numerous flock
That grazed it, stood beneath that ample cope
Uncrowded, yet safe shelter'd from the storm.

• • • • •

Embowell'd now, and of thy ancient self
Possessing nought but the scoop'd rind, that seems
A huge throat calling to the clouds for drink,
Which it would give in rivulets to thy roots ;
Thou temptest none, but rather much forbidd'st
The feller's toil, which thou wouldst ill requite.
Yet is thy root sincere, sound as a rock :
A quarry of stout spurs and knotted fangs,
Which, crook'd into a thousand whimsies, clasp
The stubborn soil, and hold thee still erect.
Thine arms have left thee—winds have rent them off
Long since ; and rovers of the forest wild
With bow and shaft have burnt them. Some have left
A splinter'd stump, bleach'd to a snowy white ;
And some, memorial none where once they grew.
Yet life still lingers in thee, and puts forth
Proof not contemptible of what she can,
Even when death predominates. The spring

Finds thee not less alive to her sweet form,
Than yonder upstarts of the neighbouring wood,
So much thy juniors, who their birth received
Half a millennium since the date of thine.

The leaves of the common Oak are deeply sinuated, and without footstalks, but those of *Quercus Robur sessiliflora*, another British Oak, are upon short footstalks, though the acorns are sessile. This last species predominated in the oak forest which formerly surrounded London; and many examples are still to be found at Lord Mansfield's beautiful seat at Hampstead, the name of which, Ken wood, alludes to them, Ken being Saxon for an acorn. The wood of this tree was also used for the roof of Westminster Hall, and many other ancient buildings which till lately were supposed to be of Chestnut. Oak wood may always easily be tested by wetting a knife and then cutting it, when the astringent property in the Oak will turn the knife black, a result that will not take place with Chestnut.

There are nearly fifty species of Oaks which may be obtained in the British nurseries; the most remarkable of which are the Cork tree (*Quercus Suber*), the cork being the bark; the Evergreen Oak (*Q. Ilex*); the American Oaks, particularly the scarlet Oaks (*Q. coccinea* and *Q. rubra*), the Live Oak (*Q. virens*), and the Willow Oak, with long narrow entire leaves

(*Q. Phellos*); and the Turkey, Fulham, and Locombe Oaks (*Q. Cerris* and its varieties). All Oak trees are very liable to be attacked by a species of gnat, and which produces excrescences on the branches. The oak apples of the British Oak, and the galls of *Quercus infectoria*, which are used in making ink, are of this nature. The Kermes, an excrescence found on *Quercus cocci-fera*, is the work of a kind of Coccus, similar to that which produces the cochineal on the *Opuntia*.

The timber of all the European Oaks is remarkably durable; but that of nearly all the American Oaks, except *Quercus virens*, is coarse grained, and so porous that it cannot be used for wine casks. The cork trees are generally grown in Spain; and as the cork when taken off the tree, curves round, it is laid upon the ground and kept flat with heavy stones; while a fire is made upon it with the branches, so as to heat it through, after which it remains flat when the stones are removed.

THE GENUS FAGUS.

THE Beech (*Fagus sylvatica*) bears very little resemblance to the Oak. The male flowers are in globular catkins (see *a* in *fig.* 87), each flower consisting of a bell-shaped calyx (*b*), cleft into five or six teeth, and containing eight or

ten stamens, which project beyond it. The female flowers also grow in globular heads (c)

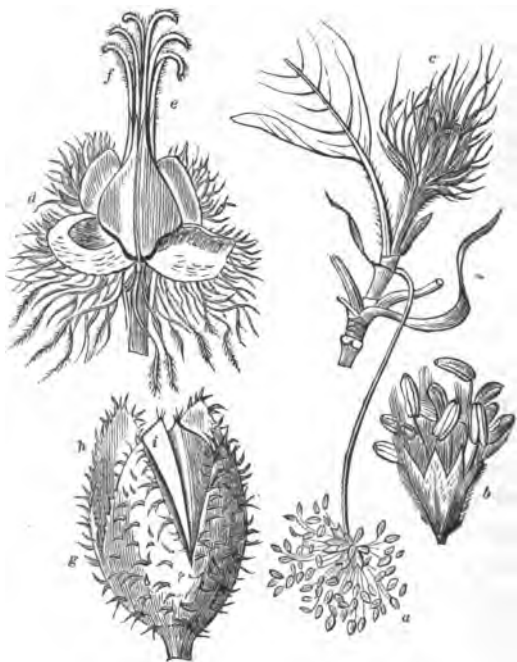


FIG. 87.—THE BEECH (*Fagus*).

two or three together, surrounded by a great number of linear bracts, which gradually grow together, and form a four-lobed involucre shown open at *d*. In the centre of this involucre are two or more female flowers, each surrounded by

a hairy calyx, cut into teeth at the tip (*e*). Each flower has three styles (*f*); and the ovary, which is sharply angular, has three cells, with two ovules in each. As the fruit swells, the linear bracts diminish, till at last they have only the appearance of small spines on the involucre (*g*), which opens when ripe into four valves (*h*), and contains two or three angular nuts (*i*), which are called the mast. The leaves of the Beech are of thin and delicate texture, and they are strongly feather-nerved. The tree is large and very handsome, and it is easily known, even in winter, by the smooth shining white bark of the main trunk. There are only two species of *Fagus* common in British gardens, and these are the common Beech (*Fagus sylvatica*) which has numerous varieties, including one with dark reddish purple leaves, generally called the Purple Beech; and the American Beech (*F. ferruginea*), the leaves of which are copper-coloured.

There are, however, two species from Terra del Fuego, which have been introduced, but they are at present rare. One of these (*F. betuloides*) is called the Myrtle tree in Van Dieman's Land, where it is also found wild, and it is remarkable for producing a fungus on its trunk, which, when cut in slices and cooked, is said to be very good to eat.

THE GENUS CASTANEA.

THIS is a very small genus, only containing two or three species, of which only one, the Sweet Chestnut (*Castanea vesca*) is common in England. This plant was included by Linnæus in the genus *Fagus*, but it appears very distinct. The male flowers are produced round a central axis, but so far apart as hardly to be like a

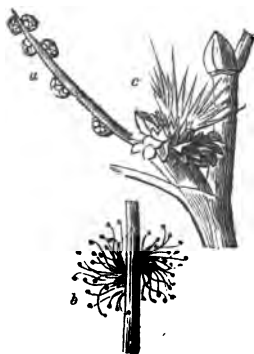


FIG. 88.—CHESTNUT (*Castanea vesca*).

catkin (see *a* in *fig.* 88). These flowers in the bud look like little knobs, but when they open the stamens burst out, as shown at *b*. Each flower has a large and a small bract, and from ten to fifteen stamens. The female flowers are disposed in a tuft as shown at *c*, surrounded by a number of bracts

and scales, which afterwards grow together and form a spiny involucre (see *fig.* 89 *a*,) which forms the husk of the ripe nuts (*b*), and opens into four valves as shown at *c*. Each female flower has a closely-fitting calyx, toothed at the tip, which afterwards becomes the hard brown skin that envelops the kernel of the ripe nut; and

each flower is furnished with six styles, having as many cells with two ovules in each, though

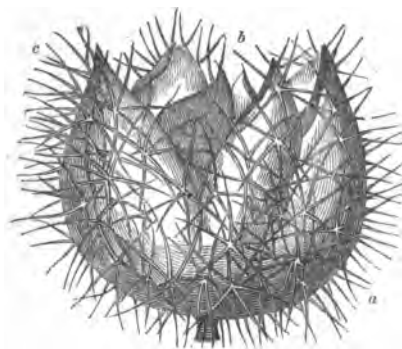


FIG. 89.—FRUIT OF THE SWEET CHESTNUT.

generally all the cells unite into one, and most of the ovules wither before the fruit ripens. There are three female flowers in each involucre, which lie nestling together like birds in a nest. When ripe the involucre or husk opens naturally into four valves (as shown in *fig. 89*), and drops the one or two Chestnuts which it contains. Each nut, when ripe, is enveloped in a brittle shining skin formed of the metamorphosed calyx, and consists of only one cell, in which are one, two, or at most three kernels, which are the seeds.

THE GENUS CORYLUS.

THE Hazel Nut (*Corylus Avellana*) has the male and female flowers on the same tree; the male being in long catkins and the female ones in little oval buds, something like those of the Oak, (see *a* in *fig. 90*.) which are so small that they would hardly be seen on the tree, if it were not for their bright red stigmas. The



FIG. 90.—THE HAZEL (*Corylus Avellana*).

male flowers (*fig. 91*) have each three bracts, one behind the two others, to the inner ones of which are attached eight stamens. As the buds containing the female flowers

expand, two or three small leaves make their appearance between the scales (*b* in *fig. 90*), so that gradually the bud becomes a little branch, bearing the female flowers at its tip. Each flower has two long stigmas, and the ovary is enclosed in a closely-fitting calyx (*c*) toothed at the upper part, the whole being enveloped in a deeply cut involucre (*d*), which afterwards becomes the husk of the ripe nut. This in-



FIG. 91.—MALE FLOWER OF THE HAZEL.

volucre is not closed, as in *Fagus* and *Castanea*, but it is open at top ; the nut, as in all cupuliferæ, adhering to it, when young, by the hilum or scar visible at its base. There are about seven species of *Corylus*, of which the most remarkable is the Constantinople Nut (*Corylus Colurna*). The Filbert is only a variety of *Corylus Avellana*.

• THE GENUS *CARPINUS*.

SOME botanists include this genus and that of *Ostrya* in the order Betulaceæ, instead of placing them in Cupuliferæ, as the nut of the Hornbeam is not surrounded by a cup or husk, but by a leaf-like involucre as shown in *fig. 92*, at *a*, *b* being the nut.

Both the male and the female flowers are produced in long catkins, which have an exceedingly light and elegant appearance on the tree.

The male flowers consist each of one bract,

with twelve or more stamens attached to its base ; and the female flowers have each two very long stigmas, and a ribbed calyx, which adheres to the ripe nut and assumes the appearance of a hard brown skin. The leaves are feather-nerved and persistent, like those of the



FIG. 92.—FRUIT OF THE HORN-BEAM.

Beech, frequently remaining on the tree, though in a withered state, till spring.

The nut appears ribbed when ripe, from the remains of the metamorphosed calyx, and it contains only one seed ; though, as in the other allied genera, the ovary had two cells, with an ovule in each.

THE GENUS *OSTRYA*.

THE Hop Hornbeam (*Ostrya vulgaris*) was included in the genus *Carpinus* by Linnæus ; and indeed the general construction of the flowers is the same. The male catkins are, however, very much longer, and the female catkins much shorter, and closely resembling those of the Hop.

THE ORDER PLATANACEÆ.

THIS order formerly included the Plane trees and the Liquidambar ; but many botanists now put the latter tree in a separate order, which they call Balsamacea.

THE GENUS *PLATANUS*.

IN the Oriental Plane (*Platanus orientalis*) the male and female flowers are both in globular catkins. The male flowers are composed of very small, but rather fleshy bracts, which remain on after the stamens fall ; and the female flowers

are each furnished with bracts, and have two long stigmas. Both kinds of flowers are so small as not to be seen without a microscope. The fruit is covered with fine hair. The globular catkins retain the bracts, and these remain on after the seed has fallen, giving the tree a very singular appearance even in winter. The Occidental Plane (*P. occidentalis*) differs principally from the preceding species in the leaves being more downy beneath; the buds are also so downy that the tree in America is called the Cotton-tree. Both kinds are remarkable for the manner in which the bark becomes detached from the main trunk and peels off.

THE GENUS LIQUIDAMBAR.

THE common Liquidambar (*L. styraciflua*) is remarkable for the beautiful crimson which its maple-like leaves take in autumn. The male flowers are on an upright catkin, and the female ones in a globular one, like the Planes. When the fruit is ripe, the numerous capsules that surround the globular catkin burst, and the seeds, which are winged, are scattered by the wind.

THE ORDER MYRICACEÆ.

THE principal genera are *Myrica*, the Sweet Gale; *Comptonia*, a curious shrub with fern-

like leaves; and Casuarinæ, a New Holland tree without leaves, but with jointed leaf-like stems.

THE GENUS MYRICA.

THE male flowers are produced in rather long erect catkins, each having only one scale, and four stamens. The female catkins are short, and each flower has three scales or bracts; the ovary has two long stigmas, and the fruit is a drupe, the scales becoming fleshy when ripe. The bracts and leaves are covered with glands filled with aromatic oil; and in *M. cerifera*, the fruit is covered with a waxy secretion, which is used as wax.

THE ORDER GARRYACEÆ.

THIS order consists of only one genus, *Garrya*.

THE GENUS GARRYA.

Garrya elliptica is an evergreen shrub remarkable for its long and graceful male catkins, the flowers of which consist of four stamens within a four-cleft calyx, enclosed within bracts united at the base. The female flowers are on a different plant, and the fruit is a berry not opening naturally.

CHAPTER XII.

THE CONE-BEARING TREES: ILLUSTRATED BY THE SCOTCH PINE ;
THE SPRUCE FIR ; THE SILVER FIR ; THE LARCH ; THE
CEDAR ; THE ARAUCARIA ; THE ARBOR VITÆ ; THE CYPRESS ;
THE DECIDUOUS CYPRESS ; THE JUNIPER ; THE YEW ; AND
THE CYCADEÆ.

THE greater part of the trees included in this chapter are comprised by Richard, De Candolle, and other foreign botanists, in the order Coniferæ ; which they have divided into three sections : viz., the Abietinæ, or Pine and Fir tribe ; the Cupressinæ, or Cypress tribe ; and the Taxinæ, or Yew tribe. The last tribe, however, Dr. Lindley has formed into a separate order, which will probably be adopted. Most of the genera have, what the Germans so graphically call needle leaves ; that is, their leaves are long and narrow, and terminate in a sharp point. The flowers also are quite different from what is generally understood by that name ; being in fact nothing but scales : those of the male flowers containing the pollen in the body of the scale, and those of the female producing the ovules, or incipient seeds at the base. The fruit of the Abietinæ is a cone, the scales of

which open when the seeds are ripe. That of the Cupressineæ is also called a cone by botanists, but it is rounder, and has not so many scales. The fruit of the Taxineæ is an open succulent cup, bearing the seed or nut in its centre.

Linnaeus placed nearly all the hardy Abietineæ in the genus *Pinus*, and since his time botanists have disagreed exceedingly respecting the generic names of the different plants; no less than twelve different divisions of them having been published, by as many eminent botanists, since the commencement of the present century. The best, however, appears to be that of M. Richard, which was approved by De Candolle, and which has been adopted with a slight alteration in Mr. Loudon's *Arboretum Britannicum*. According to this arrangement, the hardy Abietineæ are divided into five genera; viz., *Pinus*, the Pine, including all the resinous trees with long leaves, which grow two or more together in a sheath; *Abies*, the Spruce Fir, the leaves of which do not grow in a sheath, but are scattered round the branches, the leaves themselves being short, flat, and the same on both sides; *Picea*, the Silver Fir, the leaves of which resemble those of *Abies*, except that the edges curl in, and the under surface is quite different from the upper one, being marked with two white lines, one on each side the midrib; the

leaves are also placed nearly in two rows, one on each side the branch; *Larix*, the Larch, the leaves of which are very slender and produced in tufts, but which fall off every winter; and *Cedrus*, the Cedar, the leaves of which resemble those of the Larch, but which do not fall off every winter. The distinctions between these genera in the leaves only are very clear, and easily remembered; and their cones differ as decidedly: those of the Pines are hard and thick at the tips of the scales, which remain on after the seed drops; those of the Spruce Firs are thin at the tips of the scales, which also remain on the cones after they have lost their seeds, and the cones are drooping, and tapering at both ends; those of the Silver Firs are erect, cylindrical, and of nearly the same diameter throughout, and the scales fall with the seeds; those of the Larch are erect, but small and conical, and the scales remain on after the seeds have fallen; and those of the Cedar are erect, oval, and with deciduous scales. To the hardy genera may now be added *Araucaria*, as one species of this genus (*A. imbricata*) has been found quite hardy in Britain.

The Cupressinæ are divided into four or five genera; viz., *Thuja*, the Arbor Vitæ, some of the species of which have been formed into a new genus under the name of *Callitris*; *Cupressus*,

the Cypress; *Taxodium*, or *Schubertia*, the deciduous Cypress; and *Juniperus*, the Juniper. The only needle-leaved trees belonging to Taxinæ belong to the genus *Taxus*, the Yew, unless we separate from it the new genus *Torreyea*.

§ 1. THE ABIETINÆ.—THE PINE AND FIR TRIBE.

THE plants included in this section, with the exception of the Larch, are evergreens. They are all lofty trees, with straight erect stems, and their branches growing in whorls or tiers, so as to produce a very peculiar and striking effect. The male and female catkins are on the same plant; the female one containing two seeds at the base of each scale. The pollen of the male flowers is so abundant that any one passing through a grove of these trees in May or June, might fancy it was raining brimstone. Most of the species are timber trees, producing the wood called deal; that used for the flooring and other parts of houses, being principally the wood of the Scotch Pine, and the Norway Spruce. Most of the species produce turpentine, which is the thin part of the sap which flows from the tree when a notch is cut in the trunk; the thick part of the sap when purified by boiling is the yellow resin. Tar is produced by cutting the roots and wood of pine and fir

trees into pieces, and putting them into a sort of oven; when the tar runs from the charred wood, and lamp-black is made from the soot which collects on the roof of the oven. Pitch is boiled tar. Pyroligneous acid is obtained by burning the wood into charcoal in an iron cylinder, and condensing the vapour that arises from it.

THE GENUS PINUS.

THIS genus, according to Linnæus, was made to include all the Pines and Firs, the Cedar and the Larch; and this arrangement has been followed by the late A. B. Lambert, Esq., in his magnificent work on this tribe. In its present restricted form, it contains only those plants that have long slender leaves, which are produced in membranaceous sheaths, (see *a* in *fig.* 93) two, three, or five together. The male flowers are produced in long upright catkins, (*m*) growing two or three to-



FIG. 93.—BRANCH OF THE SCOTCH PINE.

ther, and they consist each of one scale, which is surmounted by a kind of crest, *b*. The pollen is contained in two cells formed in the body of each scale, which open lengthways, as shown in the scale of the Scotch Pine (*Pinus sylvestris*), at *g* in *fig. 94*. The female scales or carpels when ripe

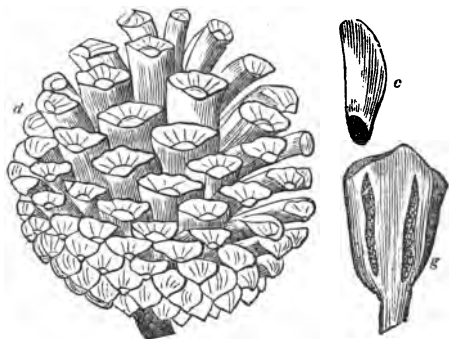


FIG. 94.—CONE OF THE SCOTCH PINE (*Pinus sylvestris*).

form a strobile or cone (*d*), and in the Scotch Pine they are thickened at the tip (*e* in *fig. 93*); but when young they appear as shown at *f*. Each scale is furnished with a thin membrane-like bract on the outside, which is conspicuous when young, but which is hidden by the scales in the ripe cone; and each has two seeds inside, which are each furnished with a long thin transparent wing (*c*). When the seed is ripe, the cone opens as shown at *d*, and the seeds falling out are carried away by the wind. When the

seed is sown and begins to germinate, the young plant sends down a root, and pushes through the ground its upright shoot, which has six cotyledons, bearing the husk of the seed upon their tip. All the species of the genus *Pinus* agree with the Scotch Pine in the construction of their flowers, and they differ from each other principally in their cones, and in the number of leaves which they have in a sheath. By far the greater number have two leaves in a sheath, (see *a* in *fig.* 93,) and among these are the Scotch Pine (*P. sylvestris*), which has small straight cones without prickles; *P. Banksiana*, which has crooked cones; *P. pungens* and other American Pines, which have prickly cones, every scale being furnished with a sharp spine; the Corsican Pine (*P. Laricio*), and several allied species, which have no spines on their cones, but every scale curving outwards; the Pinaster (*P. Pinaster*) which has large cones, with very short broad spines, and the Stone Pine (*P. Pinea*), the cones of which are smooth and shining, and very large, and the seeds of which are eaten. The pines that have three leaves in a sheath, are chiefly natives of North America, and have prickly cones; such as *Pinus Teda* and its allies, *P. ponderosa*, remarkable for its heavy wood which sinks in water, and its large spreading branches; and

P. Sabni and *P. macrocarpa*, which have long, slender, drooping leaves, and very large hooked cones. The pines which have five leaves in a sheath, include, among others, the Weymouth Pine (*P. Strobis*), the cones of which are long, narrow, and drooping (see *fig. 95*); *P. Lambertiana*, which has



FIG. 95.—WEYMOUTH PINE (*P. strobis*).

cones above a foot long; and *P. Cembra*, which has an oval cone, the scales of which are concave, and the seeds without wings.

THE GENUS ABIES.—THE SPRUCE FIR.

THIS genus includes all the Spruce Firs, and they are readily distinguished from the pines by their drooping cones (see *a* in *fig. 96*), the scales of which are not thickened at the tip, but drawn out into a thin brittle membrane; and their leaves, which do not grow erect in sheaths,



FIG. 96.—SPRUCE FIR (*Abies excelsa*).

but in rows standing out from the branches (*b*), and which being the same on both sides, look as if two had grown together to make one. The difference between the Pines and the Firs will be seen clearly by comparing *fig. 96*, which represents a branch of the Spruce Fir, with *fig. 97*, which represents a branch of *Pinus pumilio*, a dwarf variety of the Scotch Pine.



FIG. 97.—*Pinus pumilio*.

The common Spruce Fir (*Abies excelsa*) is a tree of stately growth, with an erect pyramidal form, and numerous tiers of drooping branches. It is the loftiest of European trees, having been found in Norway 180 feet high. The crest of the male flower is larger than in the genus *Pinus*, as shown at *d* in *fig. 98*, in a

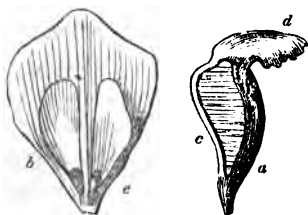


FIG. 98.—THE SPRUCE FIR (*Abies excelsa*).

magnified side view of one of the cells of a male scale (*a*), from which the pollen has been discharged, the empty case being shown at *c*. The female scales (*b*) have each

a small bract at the back, and two seeds inside, (*e*) the wings of which have each a little cavity

at the lower part in which the seed lies, so that it is naked on one side, and clothed by the wing on the other. The Spruce Fir bears cones when the trees are of a very small size ; and these cones are very ornamental when young, being of a rich purple, while the male catkins are yellow tinged with red at the base. The sap from the Spruce Fir does not flow freely when the bark is wounded, as it does from the Scotch Pine ; but oozes out gradually, and is what is called Burgundy pitch in the shops. Spruce-beer is made from the young shoots of the American Black Spruce. There are many species of *Abies*, but the most interesting are *Abies Douglasii*, a very handsome tree only lately introduced, of very quick growth ; and the Hemlock Spruce (*Abies canadensis*). This genus is called *Pinus* by the Linnean botanists, *Picea* by Professor Link and some German botanists ; and Dr. Lindley, who calls it *Abies*, includes in it the Silver Fir, the Larch, and the Cedar.

THE GENUS PICEA.—THE SILVER FIR.

THIS genus, which includes all the Silver Firs, is readily distinguished from *Abies* by its leaves, which grow in two rows, one on each side the branch ; thus the branch lies quite flat when placed on a table, or any other level surface. The leaves are also not the same on both sides

as in the Spruce Firs, but the under side is marked by two distinct lines of silvery white, one on each side the midrib. The cones stand erect, and the dorsal bract is frequently so large as to appear above the tips of the scales; and the scales themselves are deciduous, falling off when the seeds are ripe, leaving the central rachis bare. This last peculiarity is very striking; as both the Pines and Spruce Firs retain the scales of their cones after the seeds have fallen. The seeds of the Silver Firs are much larger than those of the Spruces; and they are not attached to the wing in the same manner. The Silver Fir is a noble tree, and takes its name from the epidermis of its bark; which in young trees is of a whitish grey, and smooth, though when the tree is about fifty or sixty years old, it cracks and peels off, leaving the dark brown rough bark beneath. The cones are produced two or more together; they are upright and cylindrical, being nearly as large at both ends as in the middle. The leaves all curve upwards at the point, thus showing conspicuously the white lines on the under side. A remarkable circumstance connected with this tree is, that when it is cut down, the stump will remain alive for many years, and even increase considerably in size, without producing any leaves or branches. One in the forests of the

Jura, which was ascertained to have lived ninety-two years after the tree had been cut down, had completely covered the section of the wood with bark. Strasburgh turpentine is produced from this tree. There are several species of this genus, some of which, as for example, *Picea Webbiana*, do not show the dorsal bract; while others, as *P. nobilis*, and *P. bracteata*, have it so large as to make the cone appear quite shaggy. All the species abound in resin, which frequently exudes from the cones. This genus is called *Abies* by Professor Link, and the German botanists.

THE GENUS LARIX.—THE LARCH.

THIS genus consists of only three species, which are easily distinguished from the other Abietinæ by their losing their leaves every winter. The common Larch (*Larix europæa*) is a very handsome tree, with drooping branches, and foliage of a yellowish green, which dies off of a red tinge in autumn. The leaves are linear, and they are produced in tufts in a sort of woody sheath, some of them appearing in the same sheath with the female catkins. The male catkins are smaller, but appear in the same manner. The cones are small, and show the dorsal bracts when young, but when ripe they are seldom visible. The seeds are winged,

and so very small, that it appears wonderful that a tree frequently above a hundred feet high can spring from them. The cones are of a bright red when young, but they become brown when ripe. The Larch grows very rapidly, and in situations where no other tree would thrive. Its wood is very valuable, and its bark is nearly as useful for tanning as that of the oak. The trees, however, in some situations are subject to a disease called pumping, by which the centre of the trunk becomes as hollow as though it were intended for a pump. The sap of the Larch produces the Venice turpentine; and in some parts of France a kind of gum, called the Manne de Briançon, which is used medicinally, is collected from the leaves.

THE GENUS CEDRUS.—THE CEDAR.

THERE are only two species in this genus, the Cedar of Lebanon (*Cedrus Libani*), and the Deodar (*C. Deodara*). The male catkins of the Cedar of Lebanon are produced singly, and each scale has a large crest. The cones are ovate, and the scales, which are very short and broad, fall with the seeds, in the same manner as those of the Silver Fir. The leaves resemble those of the Larch, but they are not deciduous. The male and female catkins are very often on different plants; and the trees attain a con-

siderable age before they produce perfect seeds. The Cedar is remarkable for the enormous size of its branches, and for the shelf-like character they assume. The tree in a living state lasts several centuries, but the wood is of a very coarse grain and not at all durable; and though the resin appears so abundant in the cones as to ooze through the scales, there is so little in the trunk that it is never used for turpentine.

The Deodar Cedar (*C. Deodara*) closely resembles the common Cedar in its catkins and cones, but the foliage is of a beautiful glaucous green, and the leaves are so much longer as to give a peculiarly graceful character to the tree. The wood is remarkably durable, very fragrant, and of an extremely fine grain, taking so bright a polish, that a table which Mr. Lambert had of it in his drawing-room has been compared to a slab of brown agate. The trunk abounds in resin, and it produces in India a great quantity of fluid turpentine, which though it is of rather a coarse quality, is much used by the natives; pitch and tar are also produced by charring the wood. The tree on the Himalayas grows above 150 feet high, with a trunk 30 feet or more in circumference, and it is said to live to a great age. It was only introduced into Britain in 1822, but there are numerous specimens of it in different parts of the kingdom, all of which appear quite hardy.

THE GENUS ARAUCARIA.

Araucaria imbricata, the only hardy species, is a very singular tree. The trunk is quite straight, with a strong leading shoot, and whorls of branches of great length, and far apart from each other, covered closely with scale-like leaves. These large horizontal arms, clothed with closely imbricated leaves, resemble, in the young trees, snakes partly coiled round the trunk, and stretching out their long, slender, flexible bodies in quest of prey. The male and female flowers are on different trees. The male catkins are cone-shaped, the scales serving as filaments to the anthers produced at their base. The cone is round and very large, with numerous wedge-shaped scales, and large eatable seeds or nuts, which have each a short, callous, marginal wing. The trunk is covered with a very thick corky bark; the wood is white, finely grained, and durable. The trees when wounded yield a milky juice, which hardens into a fine yellow resin; and the kernel of the nut, which is as large as an almond, is used by the Indians as an important article of food. The tree is a native of the Andes of Peru, and when first introduced it was called the Chilian Pine. It has now become quite common in this country, and the Earl of Harrington has planted an avenue with it at Elvaston Castle.

There are several species, but the other kinds are too tender to bear British winters without protection. The Norfolk Island Pine (*A. excelsa*) is a splendid tree, with light feathery foliage; as is the Moreton Bay Pine (*A. Cunninghami*).

§ II. CUPRESSINEÆ.—THE CYPRESS TRIBE.

Most of the plants contained in this section are evergreen shrubs or low trees, but some of them attain a considerable size. Only one species, the deciduous Cypress, loses its leaves in winter. Many of the species are only half-hardy in Britain, and none of them are grown in this country for their timber. They all exude resin occasionally from their leaves and branches, but none of them produce turpentine. The catkins are but few flowered, and the cones are roundish. The leaves are frequently imbricated, at least when young; though in many of the species they vary considerably, even on the same tree.

THE GENUS THUJA.—THE ARBOR VITÆ.

THERE are several species of this genus, but only two are common in British gardens. Of these the American Arbor Vitæ (*Thuja occidentalis*) is the largest tree; though it seldom

grows above 30 feet high, and it is a great many years before it even attains that height.



FIG. 99.—YOUNG PLANT OF THE ARBOR VITÆ.

The male flowers and the female flowers are distinct, but on the same tree. The male catkins are small cones, with the pollen inclosed in four cases that are attached to the inside of the scale, near its base. The female catkins consist of six scales, with two ovules at the base of each ; and the ripe cone has a sharp point projecting from each scale. The seeds have scarcely any wing ; and when they germinate, they have only two cotyledons. The young plants send down a very long tap root (see *fig.* 99), and have some of their leaves imbricated and others loose. The Chinese Arbor Vitæ (*T. orientalis*) seldom reaches the height of 20 feet, but it may be also distinguished from the preceding species by its more dense habit of growth, by its branches being turned upwards instead of spreading horizontally, and by its leaves being smaller, closer together, and of a lighter green.

THE GENUS CALLITRIS.

CALLITRIS is a genus separated from *Thuja*, of which only one species is as yet common in British shrubberies. This is the Gum Sandarach-tree, formerly called *Thuja articulata*, but now named *Callitris quadrivalvis*. The branches of this tree are articulated, that is, they may be broken off at the joints without lacerating the bark. The leaves are very small, quite flat,

and articulated like the branches. The male catkins form a cone, in which the scales are disposed in four rows, with three or four anthers at the base of each. The female catkins are solitary, and they divide, when ripe, into four woody valves or scales, only two of which bear seeds. The seeds are small, and have a wing on one side. The tree is a native of Morocco and Barbary, in which countries it produces the gum-sandarach, which exudes like tears from every part of the plant. The wood is fragrant, very finely grained, and extremely durable, as is shown in the roof of the Cathedral of Cordova, built in the ninth century, which is of the wood of this tree.

THE GENUS CUPRESSUS.—THE CYPRESS.

THE evergreen cypress (*Cupressus sempervirens*) is a cone-like, tapering tree, with its branches growing close to its trunk, and rarely attaining the height of fifty feet even in its native country. The male catkins are longer than those of the arbor vitæ, and the female ones contain more ovules. The cone is buckler-shaped, and it divides, when ripe, into eight or ten corky scales, each of which has four nuts attached; the cone being partially divided into cells, which may be seen, when the scales have been removed to show the interior. The pollen of each male

flower is contained in four cells, attached to the lower part of the inside of the scales. The wood is remarkably hard and fragrant, and it is of a fine close grain; it is also very durable. It is supposed to have been the gopher-wood of Holy Writ, and the citron-wood of the ancient Romans, the beauty of which in tables was so celebrated.

The White Cedar (*Cupressus thyoides*) is a species of Cypress, having imbricated leaves, and the same kind of cone; and the Cedar of Goa (*C. lusitanica*) is another species of *Cupressus*, which appears from the shape of its cones to be nearly allied to the *Arbor vitæ*. There are some other species, but they are not common in British gardens.

THE GENUS *TAXODIUM*.—THE DECIDUOUS CYPRESS.

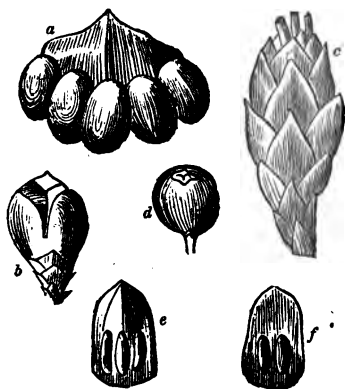
THE Deciduous Cypress (*Taxodium distichum*) has numerous leaves arranged in two even rows, one on each side the branch, which fall off in autumn, assuming a reddish tinge before they drop. This genus was separated from *Cupressus*, because the male catkins, instead of being produced singly at the tips of the branches, are in clusters or panicles, and the anther-like scales, have the pollen in five cells. The cone, which is very small, has only two seeds to each scale, instead of four; and the young plant has five

or more cotyledons, while the Cypress has only two. The deciduous Cypress was placed in the genus *Cupressus* by Linnæus, and afterwards it was called *Schubertia disticha* by Mirbel. The tree, which grows 120 feet high and upwards in America, with a trunk forty feet in circumference at the base, has generally, when of this size, the lower part of its trunk hollow, often to the height of five feet or six feet from the ground. The roots also send up conical protuberances two feet high, and four feet or five feet wide, which are always hollow. These curious knobs are called in America "cypress knees;" and the negroes use them for bee-hives. The wood of the deciduous Cypress is used in building in Virginia. There is another species (*T. sempervirens*) which does not lose its leaves in winter, a native of California, but it has not yet been introduced.

THE GENUS JUNIPERUS.—THE JUNIPER.

The species of this genus are extremely variable in their leaves, which differ exceedingly on the same plant, and in the size to which the plants attain; as even the common Juniper, though generally a shrub not above three feet high, sometimes becomes a tree. In the common Juniper (*Juniperus communis*) the leaves are narrow and pointed, and they are placed in

whorls, three in each, round the branches. The male and female flowers are generally on different plants, but sometimes on the same. The male catkins are sometimes at the end of the shoots, but generally they spring from the axils of the leaves. The pollen cases vary from three to six, and they are attached to the back of each scale, which may be called the stamen (see *a* in *fig.* 100). The female catkin, when young,



resembles a very small bud, and consists of three fleshy ovaries, almost hidden by the thick scales at their base. These ovaries grow together, and soon present the appearance shown, but mag-

nified, at *c*. As they ripen, they rise out of the scales and become the fleshy strobile, *b*; and finally the spongy berry shown of its natural size at *d*, containing three seeds or nuts, each of which is flat on one side, *f*, and angular on the other, *e*, with five glandular indentations at its base. The berries are first green, but they afterwards

become of a dark purple, and are covered with a fine bloom. The Juniper berries are very fragrant, and the glands in their stones contain a kind of oil. These berries when crushed are used in making gin and hollands.

There are a great many species of *Juniperus*, but one of the most remarkable is the Red Cedar (*J. virginiana*). This is a tree forty feet or forty-five feet high. The leaves, when young, are scale-like; but when older they become loose and feathery, so that there are two kinds of leaves on the same tree. The male and female flowers are very small, and the berry is only two-seeded. The sap-wood of this tree is quite white, but the heart-wood is red, and it is used occasionally for making black-lead pencils, particularly those of the commoner kinds, though the Bermuda Juniper is preferred for the superior ones. This last species (*J. bermudiana*) is rather tender in England, and it is seldom grown in this country. Its berries are of a dark red, and they are produced at the ends of the branches; and the wood has so strong a fragrance that shavings of it are put in drawers to keep away moths. The Savin (*J. Sabina*), and several other species, have the old leaves scale-like, as well as those on the young wood. All the species have berry-like fruit, which is generally purple or dark red, and which varies principally in the number

of stones or nuts that it contains. The fruit of all the Junipers is very slow in ripening, and in some of the species it remains two years on the tree.

§ 3. TAXINEÆ.—THE YEW TRIBE.

The only needle-leaved tree in this section is the Yew, and this is the only one I shall describe; as though the *Salisburia* and some of the New Zealand resinous trees are included in it by modern botanists, the latter are at present very rare in this country; and the *Salisburia*, though it has been introduced more than a hundred years, and is frequently found in shrubberies, has not yet produced fruit in Britain.

THE GENUS *TAXUS*.—THE YEW.

The common Yew (*Taxus baccata*) has the

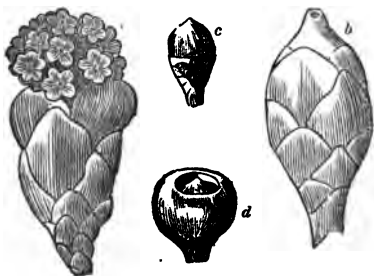


FIG. 101.—THE COMMON YEW (*Taxus baccata*).

male and female flowers on different plants.

The catkins of the male flowers consist of a number of scales, out of which the anthers grow like a cluster of primroses, as shown, magnified, in *fig.* 101 at *a*. The female flowers somewhat resemble those of the Juniper; the ovary being enveloped in scales (*b*), from which it gradually emerges as it swells (*c*), till at last, when ripe (*d*), it opens at the top, and displays the ripe nut enveloped in a red juicy cup. The wood of the Yew is remarkably tough, and the growth of the plant is very slow.

To these may be added the very singular plants comprised in the order Cycadaceæ, which are on the debatable ground between the exogenous and endogenous plants. They bear cones like the pines and firs, but in their leaves, and the manner in which they unroll them, they resemble the ferns, and in the outside of their stems the palms; while from the wood being in concentric circles, they must be classed among the Exogens. It would be unsuitable to a work like this to enter into any of the discussions of botanists respecting these curious plants; it may be sufficient here to say that they are considered to be trees, the central cylindrical part being called the trunk; the soft pith in which, in some of the kinds of *Cycas*, is manufactured into a spurious sort of sago. The roughness on the stem arises from the remains of the footstalks of old leaves. The

leaves are pinnate, and unroll instead of unfolding. The flowers are male and female, both of which are produced in cones in *Zamia*; and the male flowers in cones in *Cycas*, while the female ones appear on the margin, and in the notches of abortive leaves, which spring in a mass from the centre.

MODERN BOTANY FOR LADIES.

PART II.

SYNOPSIS OF THE NATURAL SYSTEM ACCORDING TO
PROFESSOR DE CANDOLLE.

INTRODUCTION.

ALL plants are by this system first divided into the Vasculares and the Cellulares; and to explain the difference between these two great divisions, it will be necessary to say a few words on the construction of plants, though this subject belongs properly to vegetable physiology. All plants are composed of two kinds of matter: viz. Cellular Tissue, which may be compared to the flesh of animals; and Vascular Tissue, which consists of spiral vessels and ducts, which may be compared to the nerves and veins. If any one will take the leaf of a hyacinth and break it by doubling it first on one side and then on the other, and will then draw the parts gently a little way asunder,

the spiral vessels will be seen distinctly with the naked eye; as though very fine, they are sufficiently strong to sustain the weight of the lower part of the leaf for a short time. Now these vessels are much more conspicuous in some plants than in others; and in some of the inferior plants, such as lichens and fungi, they are wanting altogether. Their presence or absence has therefore been chosen to mark the two great divisions of the Natural System; the Vasculares being those plants which have both vascular and cellular tissue, and the Cellulares being those which have cellular tissue only.

The Vasculares are much more numerous than the Cellulares; and they are redivided into subclasses, which it also requires the aid of vegetable physiology to explain. All plants, when in a growing state, require the moisture taken up by their roots to be elaborated, and mixed with air in the leaves before it becomes sap; that is, before it is fit to contribute to their nourishment. Now, when a seed begins to germinate, its root descends into the ground and its plumule, or ascending shoot, rises upwards; but the leaves folded up in the latter are too weak and tender to elaborate the sap; and besides, they cannot act till they are fully expanded, and they want nourishment to give them strength to unfold; the roots are also not

sufficiently developed to absorb moisture. To supply the wants of the young plant while it remains in this feeble and imperfect state, a quantity of albumen is laid up in the seed; and it is evident that this substance must be extremely nourishing, as it forms, when ground, what we call flour. The young plant is thus provided with food, till its roots are sufficiently developed to obtain it from the soil; and to enable it to elaborate this food and to turn it into sap, it is, in most cases furnished with one or more seed-leaves, or cotyledons,

(see *c* in *fig.* 102,) which drop off as soon as the true leaves are sufficiently advanced to be able to perform their proper functions. The cotyledons differ in number, form, and substance in the different genera; but in all plants, they are very different from the true

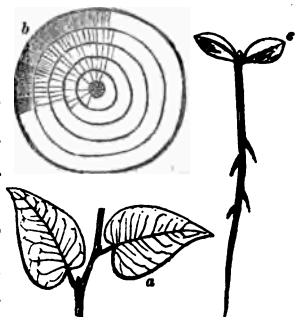


FIG. 102.—COTYLEDONS, LEAVES,
AND WOOD OF A DICOTYLEDONOUS
PLANT.

leaves, being admirably contrived for answering the end for which they are designed; and it having been found that the plants having two or more cotyledons differ widely in many other respects from those having only one coty-

ledon, the number of the cotyledons has been chosen as the distinguishing mark of the second great division of plants according to the Natural System.

The Vascular plants are therefore again divided into the Dicotyledonous plants, which have two or more cotyledons; and the Monocotyledonous plants, which have only one cotyledon: and to these modern botanists add the Acotyledonous plants, which have no cotyledon, as some of them have spiral vessels, or at least ducts, though most of the Acotyledonous plants belong to the Cellulares. These divisions are not only marked by their cotyledons, but they are so distinct in other respects, that it is sufficient for a botanist to see a leaf, or even a bit of wood without leaves, of any plant, to know at first sight to which of these three divisions the plant belongs.

If the leaf of a Dicotyledonous plant be examined, it will be found to have a strong vein up the centre, from which other veins proceed on each side (as shown at *a* in *fig.* 102); and if it be held up to the light, the rest of the leaf will be found to be intersected by numerous smaller veins, so as to appear like network, and hence these leaves are said to be reticulated. The trunk and branches of trees belonging to this division consist, when young,

of pith, wood, and bark. At first the substance within the bark is little more than pith, but as the returning sap deposits every year a layer of wood just within the bark, which presses against the previous layers so as to contract them, they press in turn against the pith, which becomes smaller and smaller every year, till at last, in old trees, it is scarcely perceptible. The layers of wood are always perfectly distinct from each other, and they are called concentric rings (*b*); while faint lines, with which they are intersected, and which proceed like rays from the remains of the pith in the centre, are called medullary rays. A layer of wood being deposited every year, the age of the tree may be discovered by counting the concentric rings; also if the tree has grown rapidly, the layers will be thicker than if it has grown slowly; and if it has had one side more exposed to the sun than the other, the remains of the pith will be on one side instead of in the centre, and the layers will be thinner on that side than on the other. The newest layer of wood, which is called the alburnum or sap-wood, is of a paler colour and more porous texture than the rest of the tree, and it is of less value as timber. It is from the manner in which the successive layers of wood are deposited that Dicotyledonous trees are called exogens, which signifies, to increase from the outside.

If the leaf of a Monocotyledonous plant be held up to the light, the principal veins will be found to form parallel lines of nearly equal thickness, the central one being very little, if any,

larger than the others (see *a* in *fig.* 103).

The trees belonging to this division are all natives of the tropics, and their softest and newest wood is in the centre, where fresh deposits are made every year inside the old wood; and hence, these trees are called endogens, which signifies, to increase from within.

The wood of these trees

has neither medullary rays nor concentric rings; and a section of it appears pierced with numerous holes (*b*), as may be seen by cutting off a slice of bamboo. The germination of a Monocotyledonous plant, with the cotyledon remaining in the ground, is shown at *c*.

The Dicotyledones and the Monocotyledones have all visible flowers, and are hence called Phanerogamæ; but the Acotyledones have no visible flowers, and they are hence called Cryp-

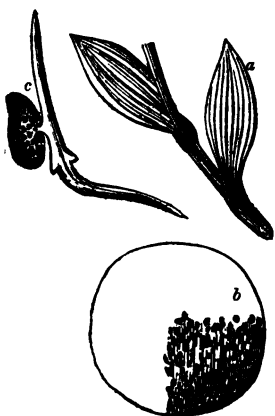


FIG. 103.—MONOCOTYLEDONOUS PLANT.

togamæ, which signifies that their flowers are hidden. The most remarkable of the Cryptogamous plants are the ferns, some of which become lofty trees; the wood of which is in curious wavy lines, as it appears to be formed by the footstalks of the decayed leaves growing together and becoming woody. The veins in the leaves or fronds of the ferns are forked.

Besides the great divisions already mentioned, the Dicotyledonous plants have been divided into the Dichlamydeæ, or those having both calyx and a corolla; and the Monochlamydeæ, or those having only a calyx; but there are so many exceptions, as to render this division of little value. The Monochlamydeæ are not subdivided, but the Dichlamydeæ are again divided into the Thalamifloræ, in which the petals and the stamens grow separately out of the thalamu or flat part of the receptacle, and generally from below the pistil; the Calycifloræ, in which the stamens and petals are either attached to the calyx, or to a lining of it formed by the dilated receptacle; and the Corollifloræ, in which the petals grow together, so as to form a cup for the pistil, and which have the stamens attached to the corolla, but quite distinct from the calyx. The Monocotyledones have also been redivided into the Petaloid, or those with regular flowers,

like the bulbous plants, and Orchidaceæ; and the Glumaceous plants, or those with scales or glumes instead of petals, as in the sedges and the grasses. The Acotyledones are divided into those with leaves, as the ferns; and those without leaves, as the mosses, lichens, and fungi.

I have only to add that each subclass is divided into numerous orders, which are differently arranged by different botanists; the object being to place those nearest together which are most alike. As no one of these arrangements appears to be decidedly better than the others, I have adopted that given in Mr. Loudon's *Hortus Britannicus*; marking, where, they occur, the new orders which have been formed, and the alterations in the old ones that have been made since that work was written.

CHAPTER I.

PHANEROGAMOUS PLANTS—DICOTYLEDONÆ—I. DICHLAMYDÆ.

§ I.—THALAMIFLORE.

IN all the plants contained in this chapter the receptacle is a fleshy substance called the thalamus, or disk, which is surrounded by the calyx, and out of which the carpels or seed-vessels, the stamens, and the petals, all grow separately from each other. Sixty-five orders are included in this division, but I shall only describe those which contain plants which have been introduced into Britain, except where the orders chance to contain plants well known in commerce.

ORDER I.—RANUNCULACEÆ.

THE plants belonging to this order are known by their numerous stamens, the anthers of which burst outwardly; by their carpels growing close together without adhering, except in one or two instances; and by the stem-clasping petioles of their leaves, which are generally deeply cut. The flowers when regular have five petals and five sepals, but they differ widely in shape, and the calyx of several of them is coloured so as to resemble a corolla. The seeds are fre-

quently cariopsides ; and the plants abound in a watery juice which is acrid, and in most cases poisonous.

ORDER II.—DILLENiaceÆ.

THIS order resembles Ranunculaceæ in having five petals, five sepals, and numerous stamens ; but the anthers burst inwardly instead of outwardly, and there are never more than five carpels, and seldom more than two, which often grow into a berry-like fruit, as in the genus *Dillenia* from which the order takes its name. One species of this genus is occasionally seen in English hothouses, *Dillenia speciosa*. It has yellow flowers with the five petals apart at the base, and the sepals edged with white. The fruit consists of five carpels growing together with a sort of crown formed by the spreading stigmas. Another genus, some of the species of which are found in British greenhouses, is *Hibbertia*. The species are generally climbing plants, with flowers like those of *Dillenia*, but smaller, though *H. dentata* has the petals close together. The difference between the genera consists principally in the carpels, which in *Hibbertia* are distinct with long filiform styles curving inwards. All the plants contained in this order are evergreen exotic shrubs and trees with simple alternate leaves, and, with only two or three exceptions, the flowers are yellow.

ORDER III.—MAGNOLIACEÆ.

THIS order was divided by De Candolle into two tribes: viz. *Illiciæ*, the Aniseed tribe; and *Magnoliæ*, the Magnolia tribe. The first, which is now made a distinct order, under the name of Winteraceæ, contains three genera, only one of which, *Illicium*, is common in this country. The only hardy species of this genus, *I. floridanum*, the Florida Aniseed tree, has very dark purple flowers, which appear to be double from the great number of the petals, which are from twenty to thirty. The carpels are also numerous, and arranged so as to form a star. All the plants in this tribe are highly aromatic, and one species, *Drimys Winteri*, which has white fragrant flowers, produces an aromatic bark that is used in medicine.

The tribe Magnoliæ is distinguished by the fruit consisting of a number of carpels arranged so as to form a cone. There are six genera in this order, the most remarkable of which are *Magnolia*, *Liriodendron*, *Talauma*, and *Michelia*, the last genus consisting of stove trees, with very fragrant flowers, which are generally of a pale yellow, and only one species of which, *M. Champaca*, has been introduced.

Of these genera *Magnolia* is undoubtedly the best known; as nearly all the species are

common in British gardens. This genus is divided into two sections, one containing the American Magnolias, and the other those from Asia, which are principally from China and Japan.

The latter may be illustrated by *Magnolia conspicua*, sometimes called *M. Yulan*. The flower-buds are inclosed in a brown hairy case formed of two short bracts which become loose at the base, and are pushed off by the expanding flower. The flower itself (see *fig. 104*) is cup-



FIG. 104.—FLOWER OF *MAGNOLIA CONSPICUA* OPENED TO SHOW THE STAMENS AND PISTIL.

shaped, and it is divided into six white fleshy petals. The calyx consists of three sepals, which fall off soon after the petals expand. In the centre of the flower is the receptacle, drawn up into a fleshy cone, with a great number of carpels attached to it, each of which has one cell containing two ovules, and a curved stigma. Around this cone grow the stamens, with very long anthers standing up like palisades, and very short thick filaments. The fruit is oval, with the ovaries somewhat distant from each other. The flowers appear before the leaves. The other Asiatic species are *M. gracilis* or *Kobus*, *M. discolor*, *obovata*, or *purpurea*, and *M. fuscata*; the former two forming handsome shrubs in the open ground, and having cup-shaped flowers which are white within and purplish on the outside, and the latter being a greenhouse plant, with brown very fragrant flowers.

The American species of Magnolia differ in having their flower-



FIG. 105.—THE FLOWER-
BUD OF THE EVER-
GREEN MAGNOLIA.

buds enveloped in one long spathe-like bract, as shown in *fig. 105*. The ovaries grow close together; and, when ripe, the carpels, which



FIG. 106.—THE RIPE FRUIT AND SEEDS OF THE EVERGREEN MAGNOLIA.

look like the scales of a fir-cone (see *fig. 106*), burst by a slit down the back; and the seeds, which are covered with a red juicy pulp, burst out, and hang down by a long white thread, which in the course of a few days withers away. The principal species of American Magnolias are the evergreen Magnolia, or Big Laurel (*M. grandiflora*); the Umbrella Tree (*M. tripetala*), which grows

like a shrub with several stems rising from the ground; the Cucumber-tree (*M. acuminata*), the flowers of which are bluish and the leaves pointed; Beaver wood (*M. glauca*), the flowers of which are small, and the leaves covered with a glaucous bloom; *M. auriculata*, *M. pyramidata* and *M. macrophylla*, which are nearly allied to the Cucumber-tree; and *M. cordata*, the flowers of which are yellowish. All these Magnolias produce their leaves before their flowers; and in this also they

differ from *M. conspicua*, the flowers of which appear before the leaves.

The genus *Liriodendron* contains only two species differing slightly in the leaves. Both are lofty trees, with cup-shaped flowers of six petals curiously stained with red and yellow, and bent back at the tip. The calyx consists of three sepals, which remain on as long as the petals. The fruit is cone-shaped, but the carpels, which are each furnished with a kind of wing, instead of opening when ripe, fall with the seed enclosed.

The genus *Talauma* differs from *Magnolia* principally in the carpels, which open irregularly by valves; and in the number of petals, which vary from six to twelve. Only two species are common in British hothouses, *T. Candolli*, commonly called *Magnolia odoratissima*; and *T. pumila*, sometimes called *M. pumila* and sometimes *Liriodendron lilifera*: both are natives of Java, and both have cream-coloured, or yellowish flowers, which are remarkably fragrant at night.

ORDER IV. ANONACEÆ.—THE CUSTARD-APPLE
TRIBE.

THE hardy plants belonging to this order, that are well known in Britain, were formerly included in the genus *Anona*; but now the only

species retained in that genus are stove plants, natives of the West Indies, with yellowish brown or dark purple flowers, the calyx of which is in three sepals, and the corolla in three or six thick fleshy petals, and which have numerous stamens with large angular anthers, and very short filaments. The carpels are numerous, but they grow altogether into a fleshy eatable fruit, divided into many cells, each containing one seed. This fruit is called the custard apple or sour sop in the West Indies; and it differs in flavour in the different species, but the most delicious kind is produced by *A. Cherimolia*, a native of Peru. The hardy species included in *Anona* by Linnæus have been separated from that genus, and formed into another under the name of *Asimina*, the principal distinction between them being in the fruit; which in the genus *Asimina* consists of two or three berry-like carpels growing together, not eatable, and each containing many seeds. *A. triloba*, the hardiest species, is a largeshrub, with dark brownish purple flowers. The plants in this order are all aromatic.

ORDER V.—MENISPERMACEÆ.—THE COCCULUS
TRIBE.

ALL the plants contained in this order are climbling exotic shrubs, generally with drooping racemes of small delicate flowers, the male and

female flowers being on different plants. The number of sepals and petals varies in the different genera, and sometimes the petals are wanting. The stamens frequently grow together into a central column; and the fruit is a drupe or one-seeded berry, generally scarlet, but sometimes black. The principal plants in this order which are known in England, are, *Menispermum canadensis* (the Canadian Moon Seed), a very ornamental hardy, climbing, shrub; *Cocculus palmatus*, the root of which is a tonic drug, called Columba root; *Anamirta Cocculus*, which produces the berries called *Cocculus indicus* in the shops, which are said to be used in porter to give it an intoxicating property; *Schizandra coccinea*, a greenhouse climber with scarlet flowers; and *Kadsura japonica*, a climbing shrub with white flowers and red berries, which proves quite hardy in the open air. *Kadsura*, *Schizandra*, and three other genera, little known in this country, have been formed into a new order under the name of Schizandriaceæ. The qualities of all these plants are tonic.

ORDER VI. BERBERIDEÆ.—THE BERBERRY TRIBE.

EACH flower of the common Berberry (*Berberis vulgaris*) has on the outside three little bracteal scales, which are reddish on the back, and soon

fall off. The flower itself consists of a corolla of six petals, and a calyx of six sepals, though as these divisions are all of the same size and shape, and of the same colour and texture, it is not very easy to distinguish the calyx from the corolla. The petals will however be found on



FIG. 107.—DETAILS OF THE FLOWER AND FRUIT OF THE COMMON
BERBERRY, PARTLY MAGNIFIED.

examination to have each two little glands at the base, as shown at *a* in *fig.* 107, which the sepals are without. The sepals are placed exactly behind the petals, so that the one appears a lining of the other; and, being concave, the

petals serve as a kind of cradle to the stamens, as shown at *b*. There are six stamens, which have broad filaments; and instead of anthers the filaments are widened at the tip, and each contains two cases for the pollen (*c*); these cases are each furnished with a valve-like lid (*d*), which opens and curls back when the pollen is ripe. The pistil (*e*) is pitcher-shaped, with a very thick style, and a flat stigma. It stands erect, while the stamens are spread out so as to be a long way from it, but they are so irritable that the slightest touch makes them spring forward and discharge their pollen on the stigma, afterwards falling back into their former places. The flowers are yellow, and they are produced in long drooping racemes; and they are succeeded by red oblong berries (*f*), each of which contains two seeds (*g*). The receptacle, with the stamens growing out of it from beneath the pistil, is shown at *i*. The common Berberries are all deciduous shrubs, with simple leaves, which are produced in tufts, as shown in *fig.* 108, each leaf being delicately fringed with hair-like teeth. Each tuft of leaves has two or three sharply-pointed stipules, which are easily distinguished from the leaves, by their margins being without teeth; and below these are three spines, which, when young, are soft and look like folded leaves, but which, when older, be-

come hard, and sharply pointed. These spines are considered by some botanists to be abortive branches. There are many different kinds of



FIG. 103.—FLOWERS OF THE BERRBERRY, NATURAL SIZE..

Berberry, which differ principally in the size of the flowers and in the colour of the fruit; but which also vary in the size and shape of the leaves, and in the manner in which they are toothed.

The Ash-leaved Berberries were formed into a separate genus called *Mahonia* by Nuttall; and this genus has been adopted by Professor de Candolle, and other botanists. Dr. Lindley, however, includes all the species in the genus *Berberis*, and he has been followed by Mr. George Don in his new edition of Sweet's *Hortus Britannicus*. Whether the genus *Mahonia* be a good one or not, the plants composing it are very distinct from the true Berberries. The leaves of the *Mahonias* are evergreen, and pinnate; and the leaflets instead of being fringed with fine hairs, are broadly serrated, the points being tipped by a sharp prickle or mucro (see *a* in *fig.* 109); and the petiole is articulated, and somewhat stem-clasping at the base (*b*). The flowers are in erect racemes, and smaller than those of the Berberry; they are also more globular, being less widely opened, and the petals are without any glands. The filaments of the stamens have two hair-like teeth just below the lobes of the anthers; and the fruit has from three to nine seeds in each berry; while the Berberries have

only one or two. There are many kinds of *Magnolia*, but the handsomest is *M. Aquifolium*,



FIG. 109.—A COMPOUND LEAF, BEING THAT OF *MAHONIA AQUIFOLIUM*.

a hardy shrub, with dark green shining leaves, like the holly. All the species both of *Berberis*

and Mahonia have yellow flowers; and the Mahonias all flower very abundantly, and very early in spring.

The principal other plants belonging to this order are, *Nandina domestica*, a very pretty shrub with white flowers, from China, which requires a greenhouse in England; several species of *Epimedium*, some of which are from Japan, with purple and white flowers; a few species of *Leontice*, pretty plants with yellow flowers; and a plant called *Diphylleia cymosa*, with white flowers and blue berries, a native of North America. All these plants are easily recognised by their broad stamens, and the curling back of the valves of their anthers.

ORDER VII. PODOPHYLLACEÆ.—THE MAY-APPLE
TRIBE.

THIS order contains only two genera; viz., *Podophyllum* and *Jeffersonia*; both of which have a calyx of three or four sepals, and a white corolla of from six to nine petals. *Podophyllum* has numerous stamens, and a fleshy berry with only one cell, which does not open when ripe; and *Jeffersonia* has eight or nine stamens, and a capsule which opens all round the apex. *Podophyllum peltatum* is the May-apple, and its fruit is eatable when ripe, though very acid; the

leaves are very large, and peltate, that is, with the footstalk attached to the centre; and *Jeffersonia diphylla* is a little plant, without any stem but that which supports the flower. Both are natives of America, where they are found in moist shady places.

ORDER VIII. HYDROPELTIDEÆ.

THIS order, which many botanists combine with the preceding one, also consists of only two genera; viz., *Cabomba* and *Hydropeltis*; and of these *Cabomba aquatica* is a stove aquatic, and *Hydropeltis purpurea* is a hardy water plant, with peltate leaves, and dull purple flowers.

ORDER IX. NYMPHÆACEÆ.—THE WATER-LILY TRIBE.

THE principal genera in this order are *Nymphæa*, *Euryale*, *Victoria*, *Nuphar*, and *Nelumbium*. The flowers of the common White Water-lily (*Nymphæa alba*) consist of numerous sepals, petals, and stamens, all of which might be mistaken for petals, being principally distinguished by their colour. The sepals, (*a* in *fig.* 110,) are green on the outside, but they are white within, and of the same fleshy substance as the petals (*b*). The stamens (*c*) look like narrow yellow petals; they are pointed,

and bear the pollen in two lobes near the point, which open longitudinally when ripe. The inner row of stamens are without anthers, and form a kind of vandyke edging to the pistil, as shown at *e*. The pistil consists generally of sixteen carpels, growing together into a vase-like, many-celled berry, as shown at *d*; the spreading stigmas, which have also grown together, forming a kind of lid. The carpels are com-

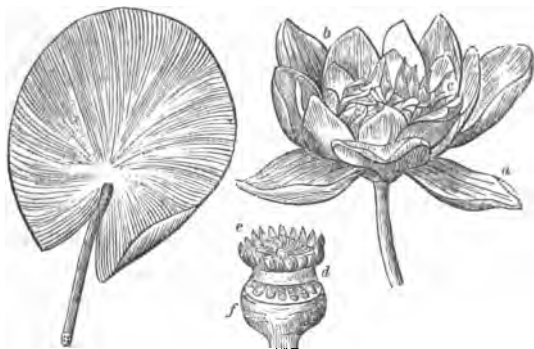


FIG. 110.—THE FLOWER, LEAF, AND SEED-VESSEL OF THE WHITE WATER-LILY, GREATLY REDUCED IN SIZE.

pletely enclosed by the receptacle which rises up round them, and forms a thick fleshy covering, as shown at *f*. The seeds are numerous, and they are covered with a thick leathery skin. The embryo is small, and it is surrounded by a great mass of floury albumen. The

leaves (*g*) are large and nearly round ; and the main root, which is called a rhizoma, is thick and fleshy, and is, indeed, an under-ground stem. There are several kinds of Nymphæa, the most remarkable of which is the Egyptian Lotos (*N. Lotos*), the flowers of which are white tinged with pink ; and both the roots and seeds of which are eaten. *Euryale* is a genus of South American Water-lilies, generally with small flowers, and large rough leaves ; and *Victoria regina*, also a native of South America, is perhaps the most magnificent Water-lily in the world ; the leaf, which is peltate and turned up at the brim, being of a deep crimson on its lower surface, is upwards of six feet in diameter ; and the flowers are more than a foot in diameter, with a corolla of more than a hundred large white petals tinged with pink.

The genus *Nuphar* consists of only three or four species, the most common of which is *N. lutea*, the common yellow Water-lily, a native of Britain. The flower has a cup-shaped calyx of five large yellow sepals, the tips of which curve inwards. The petals are small, truncate, and flat, with a small pore on the back of each ; and the stamens, which are very numerous, have broad petal-like filaments. They differ, however, very much in appearance from those of the genus *Nymphæa*, and they are differently

placed, springing from the base of the vase-like pistil, and not from the upper part. There are from sixteen to twenty carpels enclosed in the dilated receptacle, to which the stigmas form a ray-like cover; and each carpel contains several seeds. The leaves are somewhat cordate, and rise rather above the surface of the water, and the rhizoma, or root-stem, is very thick. The common yellow Water-lily, or Brandy-bottle, as it is sometimes called from the smell of its flowers, is common in every part of England, and it is generally found in small ponds or ditches. The other species are mostly natives of North America.

The Indian Lotos (*Nelumbium speciosum*) differs so much from both the preceding genera, as to be considered by some botanists to form a different natural order. The sepals and petals are so intermingled in the flower as to be scarcely distinguishable; but the filaments of the stamens are less broad and petal-like. The disk is still elevated, but it has lost the vase-like form, and it appears as though the top had been abruptly cut off; while the carpels are no longer joined together, but are plunged each separately in the fleshy receptacle, or torus, with their stigmas quite distinct. As the carpels are only half immersed in the torus, and thus show their styles and stigmas, they have a very singular

.

and bottle-like appearance; and the torus, when they are taken out of it, looks like a piece of honey-comb. The rhizoma is white and fleshy. The stalks of the flowers and leaves rise considerably above the water; and thus the flowers have not the graceful appearance of those of the *Nymphæa*, which seem to repose on the surface. The leaf is very large, being sometimes one or two feet in diameter; and it is always peltate, with the stalk exactly in the centre. There is only one seed in each carpel of the *Nelumbium*; and this seed, which has no thick leathery skin, is of about the size and shape of an acorn. It is very good to eat, having a sweet milky flavour, and in botanical construction it resembles the common bean, having no albumen, but a very large embryo. This is probably the reason why it has been supposed to be the bean of Pythagoras, and why it is called the Sacred Bean of India. One of the Hindoo fables represents the god Bramah as first appearing in the form of a child, cradled on a *Lotos* leaf, and floating on the waste of waters.

There are several kinds of *Nelumbium*, one of which, a native of America, has double yellow flowers; and they all require a stove in England.

ORDER X, SARRACENIÆ.—THE SIDE-SADDLE PLANT.

THERE is only one genus in this order, which can never be mistaken for any other, from the pitcher-shaped petioles of its leaves, and its singular flowers. It is a native of Canada, but it rarely flowers without a stove in England. It is a dwarf plant, and it is thus easily distinguished from the Chinese Pitcher plant, which grows eight or ten feet high, and which belongs to quite a different order.

ORDER XI. PAPAVERACEÆ.—THE POPPY TRIBE.

THIS tribe contains several genera, all of which have a thick glutinous juice when broken, which poisons by stupifying. The genera most common in British gardens are Papaver, the Poppy; Argemone, the Prickly Poppy; Meconopsis, the Welsh Poppy; Sanguinaria, Blood-root; Eschscholtzia; Hunnemannia; Roemeria; Glaucium, Horned Poppy; Chelidonium, Greater Celandine or Swallow-wort; Hypecoum; Platystemon, and Platystigma. Most of these plants are either annual, or last only two or three years, and they have all very handsome flowers, which are generally large and of showy colours.

The common Corn Poppy (*Papaver Rhœas*) has a showy flower, the corolla of which consists of

four very large scarlet petals, the outer two much exceeding the others in size (see *a* in *fig. 111*). The calyx is green, and it is divided into only two sepals, (see *b*,) which fall off soon after the expansion of the flower. The petals are all curiously crumpled in the bud, and they present quite a wrinkled appearance when the flowers are first opened.



FIG. 111.—FLOWER, LEAF, AND SEED-VESSEL, OF THE COMMON POPPY.

The stamens are very numerous, and the anthers, which are black, are of the kind called *innate*; that is, the filament is only attached to them at the lower part (*c*). The seed-vessel of the Corn

Poppy is, when ripe, a dry leathery capsule (*d*) with numerous angles, each angle indicating a carpel; for the capsule of the Poppy, though one-celled when ripe, consists, in fact, of a number of carpels grown together. The remains of these imperfect carpels are perceptible in the little valves shown at *f*, which open at the top of each to discharge the seed when it is ripe; and in the slightly-peaked cover (*e*), which consists of as many stigmas grown together as there appear to have been carpels. When the capsule is cut open (as shown in the capsule at *g*, from which the fourth part has been removed), remains of the carpels will be found in several projections from the sides, which partially divide the inside of the capsule into several imperfect cells, in which the young seeds are formed; though none of these portions reach the centre. The ovules, when first formed in the ovary, are attached to these projections, which are called parietal placentæ; but as the seeds ripen they become loose, and if a dry Poppy-head be shaken, they will be found to rattle. The leaves of the Corn Poppy are what is called pinnatifid; (see *h* in *fig.* 111,) that is, they are so deeply cut as to appear almost in separate leaflets; and the whole plant (except the petals and the capsule) is covered with short bristly hairs (*i*), which stand out horizontally.

The Opium Poppy (*Papaver somniferum*) differs from the Corn Poppy in several respects. First, the whole plant is glabrous, that is, devoid of either hairs or bristles; the capsule also is much larger and more fleshy in an unripe state, and the crown-like lid is smoother, and curved over like a plume of feathers, (see *a* in *fig.* 112.)



FIG. 112.—THE FLOWER, BUD, LEAVES, AND CAPSULE OF THE OPIUM POPPY, MUCH SMALLER THAN THE NATURAL SIZE.

The fleshiness of the unripe seed-vessel of the Poppy puzzled me extremely at first, as I knew that the ripe capsule of this Poppy is always dry and leathery; but it was soon explained to me, that this fleshy substance is, in fact, an elongation of the receptacle or disk, which rises up round the carpels, and envelops them, in the same way as the disk of the Water-lily grows round the pistil and carpels of that plant,

but which dries up as the fruit ripens. The leaves of the Opium Poppy (*b*) differ from those of the Corn Poppy, in being much broader, and only slightly cut or notched; they are also glaucous, that is, of a bluish or sea-green, and they are clasped round the stem at their base (as shown at *c*). All the Papaveraceæ abound in a thick glutinous juice, which in the Poppies has the colour and appearance of milk, and which possesses stupifying properties; but in the Opium Poppy this juice is particularly abundant. Opium is, in fact, procured by wounding the fleshy capsule with a sharp knife, and suffering the milky juice which exudes to dry in the sun; after which it is scraped off with a blunt instrument, and pressed into cakes for sale. The opium of commerce is produced in hot countries; but even in England, any one who chooses may procure a small quantity of opium, by wounding the fleshy capsule of the common White Poppy when it is about half ripe. A milky juice will issue from the wound, which when dry becomes opium, and would be poisonous if taken in excess. The capsule of the White or Opium Poppy has, when ripe, a little window-like opening under each stigma for the discharge of the seeds, which contain abundance of oil, and may be safely eaten, though the rest of the plant is poisonous.

There are many different kinds of Poppy; but they all agree in the corolla of their flowers being in four petals, or in some number divisible by four; and in the calyx, which is generally in two sepals, dropping off as soon as the flowers expand. All the species abound in a milky juice, which poisons by stupifying; and they all agree in the general construction of the capsule, with its fleshy envelop and its stigma-formed lid. The petals are always crumpled in the bud, and they fall very soon, so that the beauty of the flowers is very short-lived. The flower-buds droop; but when the flowers expand, the stalk becomes erect, and remains so while the capsule containing the seeds is ripening; a wise provision, common to many plants, to prevent the seeds from falling too soon. The calyx of most of the Poppies is in only two sepals; but in the two showy perennial species, called *P. orientale* and *P. bracteatum*, the calyx is in three sepals.

Among the other plants belonging to the order Papaveraceæ, may be mentioned the Horned Poppy (*Glaucium luteum*), which, instead of an obovate capsule, has a long horn-like pod, divided into two cells, the valves opening from the top to the bottom. The whole plant is glaucous; and the leaves, which are broad and notched, clasp the stem at their base, like those of the Opium Poppy. The

Prickly Poppy (*Argemone mexicana*) has the whole plant covered with strong prickles; the leaves are wrinkled and curved up at the margin; the calyx has three sepals; and the capsules are in four or five valves, the stigmas forming a kind of cross at the top. The stem and leaves when bruised give out a thick glutinous juice, which, instead of being white like that of the Poppy, is yellow.

The *Eschscholtzia* is the last genus of the order Papaveraceæ that I shall mention here, and it deserves a particular description, both from its popularity and the beauty of its flowers, and from the singularity of its botanical construction. The bud when it first appears is enfolded in a calyx, which is pointed at its upper extremity, and appears to have a kind of rim near its base. When the flower is ready to expand, the calyx detaches itself all round from the projecting rim, and rises gradually without opening, till the flower actually pushes it off. The detached calyx resembles an extinguisher, and hence it is called calyptrate, which has that signification. The flower is cup-shaped; there are four petals and four stigmas, two of which are much longer than the others. The capsules are elongated like those of the Horned Poppy, but they are distinguished by the projection of the flat fleshy disk at their

base; they are two-valved and two-celled. The leaves are glaucous, and finely cut. There are three species, or perhaps varieties, which differ principally in the degree of enlargement of the receptacle or disk. They have all large fleshy roots, which bleed copiously if wounded, and for this reason the plants are difficult to remove unless when quite young.

ORDER XII. FUMARIACEÆ.—THE FUMITORY TRIBE.

THE flowers of plants of this order are so peculiar in their shape, as when once seen to be easily remembered. There are two small sepals, which soon fall off, and four petals of an irregular shape, two of them being drawn out into a kind of spur. There are six stamens, and the fruit is silique-formed. The plants have somewhat of a smoky smell, and when broken yield a watery juice. The principal genera are *Fumaria*, *Corydalis*, and *Diclytra*.

ORDER XIII. CRUCIFERÆ.—CRUCIFEROUS PLANTS.

THE Cruciferous plants form so natural an order, that when one of them has been described the others may be easily recognised. They have all a separate calyx and corolla, each

in four divisions ; the four sepals being placed alternately with the four



FIG. 113. — THE FLOWER AND STAMENS AND PISTIL OF THE SEAKALE, TO ILLUSTRATE THE CRUCIFERÆ.

petals, the latter forming a cross (as shown at *a* in *fig.* 113), whence the name of Cruciferous, which signifies cross-bearing. There are six

stamens (*b*), two of which are much shorter than the others ; and two carpels with one style, and a capitate or divided stigma. The seed-vessel is a kind of pod, either short and broad, like that of the Shepherd's Purse (*fig.* 114), where it is called a silicle ; or long and narrow, like that of the Cabbage, which is called a silique. The two valves of the silique open naturally when ripe, from the bottom curving upwards, (see *fig.* 115,) and the seeds are deposited on a thin membrane between



FIG. 114.—A SILICLE.

the cells, which is the dissepiment. All the Cruciferæ, from abounding in nitrogen, have an unpleasant smell when decaying, like putrid flesh ; and when cultivated, they even in a wild state require abundance of animal manure ; hence, they are generally found near human habitations, or where cattle are kept. When wild, they have generally acrid properties ; and

though these are in most cases softened by cultivation, yet they are still perceptible in the roots of the Horse-Radish, and the common Radish, and in the leaves and seeds of Mustard, and the different kinds of Cress, &c. This acidity, however, is never so great as to be injurious; and Cruciferous plants, particularly if their texture be succulent and watery, may always be eaten with perfect safety.



FIG. 115.—A SILIQUE.

Even those which, in a wild state, are tough and stringy, such as the wild Cabbage and the root of the wild Turnip, become excellent by cultivation; and all Cruciferous plants are so extremely nourishing as to be considered next in this quality to animal food.

Among the many garden flowers which belong to this order, few are more popular than the common Wallflower. (*Cheiranthus Cheiri*.) Its hardiness, and the facility with which it is raised and cultivated—the gaiety of its flowers, their profusion, and their delightful fragrance, combine to make it a general favourite; and I think I cannot take a flower to illustrate the order which is more generally known and liked. The flowers of the Wallflower (see *fig. 116, a*) consist of four petals, each of which

is furnished with a long tapering point, called the claw (*b*), and a broad flat part called the limb (*c*). The claws of the petals are buried in



FIG. 116.—FLOWERS OF THE WALLFLOWER.

a calyx of four sepals, placed alternately to the petals, and somewhat swelled out at the base, (see *d*). The stigma (*e*) is two-lobed, and forms a kind of notched head. There are six stamens, which appear at first to be all nearly of the same height, but on examination it will be found that two are somewhat shorter than the others. The seed-vessel is of course the lower part of the pistil; which, after the petals drop, becomes

elongated into a somewhat cylindrical silique, which contains several flattish seeds.

The Brompton Stock (*Mathiola incana*), and the Ten-week Stock (*M. annua*), differ from the

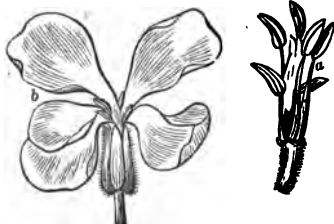


FIG. 117.—FLOWER OF THE BROMPTON STOCK.

Wallflower principally in the shape of the stigma (see *fig. 117, a*). The petals have also rather longer claws, and hang looser, as shown

at *b*. The Virginian Stock (*Malcomia maritima*) has a roundish silique, and only one stigma, which ends in a long tapering point. The Candytuft (*Iberis umbellata*) has a short pod or silicle, which has the appearance of being cut off at the point, and which contains only one seed in each cell; and the outer two petals of the flower are somewhat larger than the inner ones. Many other Cruciferous plants might be described, but I think my readers will have pleasure in seeking them out themselves, and examining them, to discover their points of agreement and of difference; particularly as, though the order is such a very large one, the flowers of all the plants are so much alike, that no one can be in doubt respecting their alliance.

ORDER XIV.—RESEDACEÆ.—THE MIGNONETTE.

THE common Mignonette (*Reseda odorata*) was once included in the order Capparideæ; but it is now made into a little order by itself, called Resedaceæ. The flower, as is well known, is by no means remarkable for its beauty, though it is for its fragrance; but when examined botanically, it will be found well deserving of attention, from the singularity of its construction. It has a green calyx of six sepals, which are only remarkable for being what botanists call linear; that is, long and narrow, and of equal width throughout—a very unusual form for sepals. Within the calyx are the petals, six fleshy, green, heart-shaped bodies; with a hair-like fringe round the lower part, and with the upper part cut into a tuft of segments so different in colour and texture from the lower part, that it is scarcely possible to believe that they are one. This upper part of the petal is called the crest, and it is pure white; the segments into which it is divided appearing to be a great number of delicate little petals growing out of a fleshy heart-shaped disk.

It is worth gathering a flower of Mignonette, and taking off one of the petals to look at it in a microscope; and one of moderate

size, which may be bought for 12s. at the Bazaars, will be quite sufficient for the purpose. It will then be found that the fleshy part of the petal is as easily detached from the rest of the flower as petals usually are, but that it is so firmly fixed to the crest as to be inseparable without cutting. The disk is, however, dilated and curiously drawn out between the stamens which are inserted in its base, and the petals, as though to form a barrier between them. It will be quite visible when the petals are removed, as it is as firmly attached to the stalk of the flower as the petals are to their crests. Between this elevated part of the disk and the calyx is a green substance which looks like a part of the stalk, but which belongs to the disk. There are twelve stamens, with large orange-coloured anthers, which are at first erect, but afterwards bend forward horizontally; and in the middle of the stamens is the ovary, an oblong hollow cell, with a three-lobed stigma, forming three erect points. Inside the ovary from each stigma runs the kind of nerve called the placenta, and to each nerve are attached three rows of seeds. The substance of the ovary is always soft and leaf-like, even when it becomes a ripe capsule; and though it is greatly swelled out and bladdery, it retains the same leaf-like and somewhat wrinkled appearance to

the last. When the capsule is ripe, each of the pointed lobes, which formed its upper extremity, opens down the middle, thus forming a curious three-cornered mouth for the discharge of the seed. The flowers form what is called an upright raceme, springing from a succulent main stem, which is, however, somewhat woody at the base. The plant indeed, though treated in England as an annual, is a shrub in the plains of Barbary, of which it is a native; and even in this country it may be made to assume the character of a small tree, by keeping it during winter in a hot-house or green-house. I was very much surprised to find that Mignonne has been introduced barely a century; and it seems difficult to imagine how those of our ancestors who were fond of flower-gardens contrived to do without it. I have only to add that there are several species of Reseda, one of which (*R. luteola*) is a British plant used in dyeing, and is called Dyer's Weed, or Weld.

ORDER XV.—DATISCEÆ.

THERE is only one genus of three species, which are coarse hardy perennials, having the appearance of hemp; and only grown in England in botanic gardens.

ORDER XVI.—CAPPARIDEÆ.—THE CAPER TRIBE.

THIS order is divided into two sections, viz., the true Capers, and the Cleomes; both of which have very long and conspicuous stamens. The common Caper (*Capparis spinosa*) has a large and handsome flower, with a distinct calyx and corolla, both in four parts. The petals are white, and so delicate in their texture as to fade in a few hours if exposed to the sun; and the stamens, which are very numerous, have rich purple filaments. In the centre is the pistil, with a very long stalk, and the ovary at the point, instead of at the base, with no style, and a very small stigma. In consequence of this curious construction, the seed-pod, which is fleshy, and hangs downwards, appears to be on a much longer stalk than the flower. The shrub is spiny, and in its natural habitat it grows among stones and rocks. It is the unopened flower-buds that are pickled. The genus *Cleome* consists principally of annuals, with very handsome flowers, which have very long stamens, and a pistil of the same construction as in *Capparis*, but the fruit is a dry capsule. The anthers of the stamens are often enfolded in the flowers before they are fully expanded, so that the filaments appear bent, till at last they open fully and hang down.

There are a few other genera in the order, but they are little known in England.

ORDER XVII.—FLACOURTIANEÆ.

THE plants belonging to this order are mostly Indian plants, little known in Europe.

ORDER XVIII.—BIXINEÆ.—THE ARNOTTA TRIBE.

Bixa Orellana is a shrub, a native of South America, which requires a bark stove in England. It has pink flowers with five petals, and a green calyx of as many sepals. The stamens are numerous; but they are on rather short filaments. The leaves are very large and heart-shaped. The fruit is a berry, and the pulp in which the seeds are immersed, when dry, is the Arnotta used in colouring cheese.

ORDER XIX.—CISTINEÆ.—THE CISTUS TRIBE.

THERE are only four genera in this order, viz., *Cistus*, *Helianthemum*, *Hudsonia*, and *Lechea*; and though there are almost innumerable plants comprised in it, they nearly all belong to the first two.

All the plants belonging to the genera *Cistus*, the Rock-rose, and *Helianthemum*, the Sun-rose,

have showy flowers, each having five petals, which are crumpled in the bud like those of the Poppy; they also resemble the petals of the Poppy tribe in falling almost as soon as they have expanded, as every one must have observed who has noticed the flowers of a Gum-Cistus. The calyx in both Cistus and Helianthemum generally consists of five sepals, two of which are larger and of a paler green than the others, and grow a little below them; and this calyx remains on after the petals have fallen, and, indeed, till the seed is ripe. In the Gum-Cistus, however, and some other species, the two outer sepals are wanting. There are a great many stamens, which are rather short, and form a tuft in the centre of the flower, surrounding the pistil, which has a round flat-headed stigma, a rather long style, and an ovary divided into five cells. The seeds are numerous, and each has a separate foot-stalk, by which it is attached to the placentas, which, in the Cistus tribe, are in the centre of the ovary, and not proceeding from its sides, as in the Mignonette. The capsule, which remains covered with the calyx till it is quite ripe, divides into five or ten concave valves, each having a placenta, to which the seeds were attached, in its centre. The seed of any plant belonging to the order Cistaceæ, is remarkable when cut open for the great

size of the embryo enclosed in it, and the curious manner in which it is curled up. The embryo is the germ of the future plant, and it is usually buried in a great mass of albumen, or floury matter intended for the nourishment of the young plant, till its roots are in a fit state to supply it with nourishment. In the seed of the *Cistus*, there is scarcely any albumen; but in its stead a long narrow embryo, coiled up like a sleeping snake.

The Gum-*Cistus* is generally called, in the nurseries, *Cistus ladaniferus*; but it differs materially from the plant so named by Linnæus, as that has a ten-celled capsule, while the capsule of the common Gum-*Cistus* (which botanists call *C. Cyperius*) has only five cells. The leaves also differ, the under surface of those of the one kind being woolly, and of the other smooth; the one is also a native of Spain and Portugal, and the other, as the specific name imports, of Cyprus. Both species, and also *C. Ledon*, exude from their stems and leaves, a kind of gum or resin called *Ladanum* or *Labdanum*, which is used in medicine. It is from this gum having been formerly always mixed with opium when that drug was dissolved in spirits of wine, that the name of *laudanum* is given to the tincture of opium.

The two genera, *Cistus* and *Helianthemum*,

differ chiefly in the capsule, which in the latter genus is triangular and one-celled, opening into three valves, each of which has a narrow dissepiment down its centre. To prevent any confusion arising from the use of these terms, I may here observe that when a capsule is divided into several cells, having no communication with each other, the membranes that separate them are called dissepiments; while the nerve-like part of it to which the seeds are attached is named the placenta. Sometimes the placenta is merely a nerve running down the side of the capsule, when the capsule is one-celled, without any dissepiment or division; and sometimes the dissepiment does not spread across the capsule so as to divide it into different cells, but only projects a little way from the side towards the centre, as in the one-celled capsule of the Poppy, (see p. 260,) and in that of the *Helianthemum*, when the seed-vessel opens naturally into different parts, as in the Gum Cistus, these parts are called valves, as are also the parts of pods, as shown in the curled-up valves of the silique, *fig.* 115, in p. 268.

To return to the *Helianthemum*, the species of this genus are generally used for rockwork, as they are all dwarf plants, though many of the genus *Cistus* are large shrubs four or five feet high. The English name of the *Helian-*

themum, Sun-rose, is very appropriate, as the flowers will only expand in sunshine, and will even decay in the bud without opening at all, when gloomy weather lasts for several days.

ORDER XX. VIOLACEÆ—THE VIOLET TRIBE.

THE order Violaceæ, though not a large one, contains several genera, but the most interesting is the genus *Viola*, which includes among many other species the Sweet Violet (*Viola odorata*), and the Heartsease (*V. tricolor*). The flowers of both species have many claims to admiration, but they do not add the charm of regularity in construction to their other attractions, as, in fact, few flowers are less symmetrical. The flowers of both are nearly alike in their details; but to avoid confusion, I will describe them separately. The calyx of the Heartsease consists of five pointed distinct sepals, two of them rather smaller than the others. These sepals are not attached, as in most other plants, at their base; but so as to leave nearly a quarter of their length standing up, far beyond the place where they are fixed to the receptacle, so as to form a sort of border or cup round the stem, and between it and the flower. The sepals are green, but they are edged with a delicate whitish membrane at the margin, scarcely to be seen without a microscope.

There are five petals which are also irregular in their construction, two of them being much larger than the others, and generally of a different colour ; and one even of the other three being quite different in form to its companions. The two large petals at the back of the flower, which in the common Heartsease are generally dark purple, are laid over each other, and behind the two below them. These two side-petals, which form the centre of the flower, are both furred at the base ; and the lower petal, which is placed between them, has its claw drawn out behind into a spur, which passes between two of the sepals ; and which, when the flower is looked at from behind, appears to be part of the calyx. The furred part of the two side-petals forms a triangular, roof-like opening, peeping out of which, is seen a small pale-green ball-like substance, which a fanciful imagination might liken to a head looking through a dormer window ; and this is all that is to be seen in place of the usual apparatus of stamens and pistils. As all seed-producing flowers must have stamens and pistils, and as it is well known that Heartseases and Violets do produce seed in abundance, it is clear that these important organs are not wanting ; but where are they ? It is easy to guess, after being so far initiated in the mysteries of botany, that the little globular body is a part of the pistil ; but

where are the stamens? It is necessary to pull the flower to pieces to discover them. Commencing this work of destruction, which I always feel remorse at perpetrating, for I love flowers too well not to feel pain at destroying them; commencing this work, I repeat, the petals and the sepals must be carefully removed from the stem; a task of some little difficulty, as both sepals and petals are firmly attached to the receptacle, and the lower petal must have its spur opened with a pin to avoid hurting the delicate organs it contains. When the outer coverings of calyx and corolla are thus both removed, the seed-producing organs will be discovered, and it will be found that they consist of five very curiously-formed stamens, with as singular a pistil, in their centre. The stamens have no apparent filaments, and the anthers, which seem to be inserted in the receptacle, look like seeds, each tipped with a bit of brown skin, and having what appears to be a white rib in front. This rib is the anther; and the broader part is the dilated filament, which is drawn out beyond it, on both sides, and above, so as to form the brown tip above the anther already mentioned. Two of the anthers have each, in addition to these peculiarities, a long tail, which the spur of the lower petal concealed, when the flower was in a perfect state. The

pistil consists of a large ovary, full of ovules, with a narrow style, which is drawn out into the hollow globular termination which is seen through the triangular opening in the flower. The globe has an opening in front, under which is a kind of lip, which looks like a shutter let down to show the opening ; and though, from its thick fleshy nature, it looks like a stigma, it is only the outer covering of that organ, for the stigma lies within the opening. In this manner the stigma and anthers are completely concealed ; and thus it will be seen, that nothing can be more complex and intricate than the construction of the flowers of the Heartsease.

Who could suppose that all these elaborate details would be necessary to illustrate so simple a flower as that of the Violet ? And yet the construction of the flowers of the Violet and those of the Heartsease are essentially the same. The sepals of the Violet are extended at the base, like those of the Heartsease, and the corolla consists of the same number of petals, which are equally irregular in their form, though not in their colour ; the lower petal is drawn out, in the same manner, into a spur, which is much longer than that of the Heartsease, though the rest of the flower is smaller. The stamens are formed with the same regular irregularity, only the tails of the two irregular

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ones are larger and stronger, in the same proportion as the spur is larger which is intended to conceal them. The pistil is of the same shape, with the same curiously constructed and perforated style, which is bent in its narrow part and swelled out into a hollow globe at the tip ; and in both species, the ovary is one-celled with three parietal placentas, that is, with three nerve-like projections from the sides of the capsule, having four rows of seeds attached to each. The capsule looks like a smooth shining berry, and it remains partially shrouded by the calyx, till the seeds are ripe ; when it bursts open with an elastic spring, and divides into three valves, each of which has the placenta bearing the seeds in its centre.

In all these points the Heartsease and the Violet are alike ; but they differ materially in the leaves, which in the Violet are broad and heart-shaped, without stipules ; but in the Heartsease are small and ovate, with such very large and deeply-cut stipules, that they are by most persons mistaken for the leaves. I may here be asked what are stipules, and in what do they differ from leaves ? In answer to the first question, I can only inform my readers that stipules are generally little leaf-like bodies, which seem to act as attendants upon leaves, as bracts seem to wait upon flowers ; but in what

they differ from leaves, except in size and shape, I have not been able to learn. Even Dr. Lindley in the last edition of his Introduction to Botany, says, "What stipules really are is not well made out."

The Heartsease and the Violet differ also in their habit of growth. The Violet is a creeping plant with no stalks but those supporting the flowers, while the Heartsease stands erect, with a thick square stem, so strong, that, notwithstanding its succulent nature, it be may trained like a little tree.

ORDER XXI. DROSERACEÆ—THE SUN-DEW TRIBE.

THERE are three genera in this tribe that are well known: *Drosera*, the Sun-dew; *Dioncæa muscipula*, Venus's Fly-trap; and *Parnassia palustris*, the Grass of Parnassus; all bog plants. The species of the genus *Drosera* are remarkable for the curious manner in which the leaves and peduncles are coiled up when they first appear, and in which they slowly unroll themselves as they grow. They are also beautifully edged with a sort of fringe of glandular red hairs, and a fluid exudes from these glands which makes them always appear as though covered with dew. The common Sun-dew (*D. rotundifolia*) is a British plant, with short roundish leaves;

but other species are natives of New Holland and North America ; and several of them have long slender leaves like threads. Venus's Fly-trap (*Dionæa muscipula*) is a native of Carolina, in North America ; the leaves are curiously formed of two lobes, which close and open as if hinged, and they are furnished with glandular hairs, which are so extremely irritable as to make the leaves close at the slightest touch, and thus to imprison any unfortunate insect that may be within the lobes. The petiole is so much dilated as to look like a leaf, but the real leaf consists of only the two roundish lobes edged with teeth that form the Fly-trap. The flowers are white, and they are produced in corymbs. The corolla has five petals, which do not fall off when they wither, but roll up so as to look like the cocoon of an insect.

ORDER XXII. POLYGALEÆ—THE MILKWORT
TRIBE.

THE genus *Polygala* is well known from the very handsome greenhouse plants which it contains. The flowers at first sight appear to resemble those of the Sweet Pea, having two wings like a standard, and a sort of keel ; their construction is, however, very curious, and so complicated, as to be very difficult either to

describe or to understand. The calyx is said by modern botanists to consist of five sepals, three of which are green and two lilac, these last being the part that resembles the standard of the Sweet Pea. The corolla is also said to consist of five petals, two of which stand erect, and the other three grow together to form the keel. The latter have their upper part cut into a kind of crest, like that of the Mignonette. Below the crest, the united petals form a kind of hood, under which are arranged the eight stamens, four on each side. The stamens themselves are as remarkable as the other parts of the flower; the filaments grow together into a thin kind of leaf, and each anther has but one cell, and opens by a pore at the apex. The pistil is also very curiously formed, as the style and stigma have the appearance of a gaping monopetalous corolla. The fruit is a flat two-celled capsule, which, when ripe, opens by two lips, separating from each other, and showing a seed within each cell. Even the seeds are not like other seeds, for each has a large white protuberance at one end, called a coracula.

ORDER XXIII. TREMANDREÆ.

SLENDER New Holland shrubs, with the habit of Heaths, rarely met with in British gardens.

ORDER XXIV. PITTOSPOREÆ.—THE PITTOSPORUM
TRIBE.

THE principal genera included in this order are *Pittósporum*, *Billardiera* and *Sollya*, all resinous shrubs, with alternate leaves without stipules, and the sepals and petals, each five in number, and laid over each other like scales in the bud. The seeds are numerous, and immersed in fibrous pulp. The commonest species of *Pittosporum* is *P. Tobira*, a native of China, easily known by its thick leathery leaves, the mid-ribs of which are strongly marked, and whitish. The flowers are erect, and produced in cymes or heads; and the petals are united into a tube with a spreading limb. The capsule is one-celled, and two or three valved, with an imperfect dissepiment in the centre of each valve; and the seeds are numerous, and buried in a resinous fibrous pulp. The *Billardieras* are generally climbing shrubs, with pale greenish bell-shaped, and almost erect flowers, which are produced singly or in pairs, and which have the tips of their petals turned back. The fruit is a fleshy berry, with a shining skin of a deep blue, and it is called the Apple Berry in Australia, of which country the species are natives. This fruit is said to be eaten in Australia, but it seems difficult to imagine how

this can be the case ; as though the outer part of the berry is of a soft spongy nature, it is dry and insipid ; and there is no internal pulp, for the seeds lie loose in the cells. In *Sollya heterophylla* the flowers are drooping, on long and very slender pedicels, and they are produced in cymes. The corolla is campanulate, with the tips of the petals not recurved, and the anthers are much shorter than in *Billardiera*. The fruit is a soft fleshy berry, divided into two cells, each containing two rows of seeds immersed in pulp, and when cut open, it smells strongly of turpentine. The plant generally called *Sollya linearis* has a dry and leathery pericardium ; and for this reason and on account of the spreading of its anthers, it was placed by Mr. Cunningham in a new genus, which he called *Cheiranthera*.

ORDER XXV. FRANKENIACEÆ.—THE FRANKENIA
TRIBE.

THE genus *Frankenia* consists principally of the British weeds called Sea Heath ; and the other genera included in the order are seldom seen in British gardens, from the seeds which have been imported seldom arriving in a state fit for vegetation.

ORDER XXVI.—CARYOPHYLLACEÆ—THE CARNATION TRIBE.

THE plants belonging to this order have so strong a family likeness to each other as to be easily recognised; and they are all distinguished botanically by the swollen joints of their stems, and their opposite undivided leaves, which are generally connate, that is united, and sheathing the stem. The order is divided into two sections, viz.: Silenææ, in which the sepals are united into a tube, and which section includes the genera *Silene*, *Dianthus*, *Saponaria*, *Lychnis*, and *Agrostemma*; and Alsineæ, in which the sepals are either quite distinct, or only slightly cohering at the base, and which includes *Stellaria*, *Arenaria*, *Cerastium*, *Spergula*, and several other British weeds. The Chickweed was called by Linnæus *Alsine media*, but the genus *Alsine* is now united to *Stellaria*.

The Wild or Clove Carnation (*Dianthus Caryophyllus*), which may be considered the type of the order, has an erect stem, swollen at the joints, with connate leaves, (see *a* in *fig.* 118). The flower, when single, consists of five petals, each with a very long narrow claw (*b*), and a rather broad limb or blade (*c*) serrated at the edge. The calyx (*f*) is tubular, with five

vandyked teeth, which are in fact the tips of five sepals, into which the tube of the calyx may



FIG. 118.—THE CARNATION.

be easily divided with a pin. The tubular form

of the calyx is admirably contrived to support the long claws of the petals, and to keep them in their proper places; particularly when the flowers are double, as the weight of the petals in that case frequently bursts the tube of the calyx. Every one fond of pinks and carnations must have observed the miserable appearance of the flower when thus deprived of its natural support; and to prevent the premature destruction of prize-flowers by this misfortune, professed florists sometimes slip a curiously-cut piece of card-board over the bud, which remains on after the expansion of the flower, and prevents the petals from falling out of place. Some florists tie the calyx round with thread, instead of using a pasteboard ring, which answers the same purpose. At the base of the calyx are two, four, or six leafy appendages (*g*), resembling bracts, which are called the calycine scales. These imbricated scales are, however, only found in the genus *Dianthus*. There are ten stamens (*d*) unequal in height, but none of them longer than the ovary round which they are placed. The ovary and the stamens are concealed in the cup of the flower, but the former is furnished with two styles, terminating in two long stigmas (*e*), which project beyond the flower, and which, when magnified, appear delicately fringed.

The genus *Dianthus* includes the Carnation, the Pink (*Dianthus plumarius*), the Chinese Pink (*D. sinensis*), the Sweet William (*D. barbatus*), and many ornamental flowers. Of these the Sweet William has the claws of its petals bearded; the flowers are produced in bundles or fascicles; and the calycine scales are so numerous and awl-shaped, that they give a bristly appearance to the flowers. The different species of Soap-wort (*Saponaria*) differ from *Dianthus*, in having no calycine scales; and this is also the case with the berry-bearing Campion (*Cucubalus baccifer*), the fruit of which is a fleshy capsule or berry, which finally becomes black, and has a singular appearance in the centre of the cup-like calyx, which remains on till the fruit is ripe. The flower of this plant is white, and the petals have a two-cleft limb. All the numerous species of Catchfly (*Silene*) are also without calycine scales, and the petals are generally deeply two-cleft; but they are distinguished by having a crown of petal-like scales in the throat of the corolla. There are also three styles instead of two; and the capsules are three-celled at the base, ending in six teeth at the top. The species have frequently a glutinous frothy moisture on the stem, in which flies sometimes become entangled, and hence the English name of the genus. One species, the

Bladder Campion (*S. inflata*), has been used as food, and its young shoots, when boiled and sent to table like Asparagus, are said to have the flavour of green peas. The different species of *Lychnis* and *Agrostemma* resemble *Silene* closely in every respect, except in the styles, which are five, instead of three; these two genera, *Viscaria*, and *Githago*, differ very slightly from each other; and several of the species are known by different names: thus Ragged Robin (*Lychnis flos cuculi*) is made by some botanists an *Agrostemma*; the Corn-cockle is sometimes called *Githago segetum*, and sometimes *Agrostemma Githago*; the common Rose Campion is called sometimes *Lychnis*, and sometimes *Agrostemma*; and the Rock *Lychnis*, or Red German Catchfly, sometimes *Lychnis Viscaria*, and sometimes *Viscaria vulgaris*.

ORDER XXVII.—LINACEÆ.—THE FLAX TRIBE.

THE order Linaceæ is a very small one; and, indeed, it consists principally of the genus *Linum*. The Flax was formerly included in the Caryophyllaceæ, which it resembles in having five petals, five sepals, and five stamens; but it also resembles the Mallow in its capsules, and in its stamens growing together at the base;

and the Cistus in its persistent calyx, and the disposition of its sepals. These links, which connect one order with another, and make them appear alike but not the same, form, I think, one of the most interesting parts of the Natural System. We are led on from one gradation to another, by scarcely perceptible shades of difference through the vegetable kingdom; and, indeed, through the whole system of creation: the beautiful harmony, and unity of design, visible throughout, bearing the strong impress of the Divinity whose power has made the whole.

The common Flax (*Linum usitatissimum*), though in its appearance only an insignificant weed, is a plant of great benefit to man. The fibres of the stem are used to make linen, and the seeds (linseed) are crushed for oil. The flowers are blue, and have five regularly-shaped petals, which are twisted in the bud; and a distinct calyx of five pointed sepals, two of which grow from a little below the others, as in the Gum Cistus; and, as in that plant, the calyx remains on till the seeds are ripe. There are five stamens, the filaments of which grow together slightly at the base, and there are five little points like filaments without anthers, rising between the stamens. The petals are connected with the ring formed by the united filaments,

and sometimes the petals themselves grow slightly together at the base. The capsule consists of five two-celled carpels, grown together ; each cell containing one seed, and each carpel terminating in a rather slender style, tipped with a ball-like stigma. When ripe, the capsule opens naturally, by dividing into ten valves, to discharge the seeds ; which are flat and shining, with a large embryo. These seeds are called Linseed in the shops, from *Linum*, the botanical name of the plant ; and, as is well known, they are not only used for various purposes, but oil is expressed from them. The stem of the common Flax, though it is only an annual, consists of woody fibre, like that of a tree in its young state ; and it is this fibrous part that makes the yarn for thread, after it has been separated from the fleshy part, by steeping the stems for a long time in water. The perennial Flax (*Linum perenne*), which, as its name imports, lasts several years, differs in little else from the common kind, except that its sepals are obtuse, and its leaves are much smaller and narrower. Both these are natives of Britain. There are many other species, some of which have yellow flowers.

ORDER XXVIII.—MALVACEÆ.—THE MALLOW TRIBE.

ALL the plants belonging to Malvaceæ bear so much resemblance to each other, that this order may be considered a very natural one ; and it is one very remarkable for the botanical construction of its flowers. In some respects it resembles Linaceæ, quite enough indeed to show clearly the chain by which they are so beautifully linked together ; but in others, it differs so decidedly as to show how completely they are distinct. *Fig. 119*, which represents the



FIG. 119.—THE FLOWER, STAMENS,
AND PISTILS OF THE *ALTHÆA FRUTEX*.

flower and seed-vessel of the *Althæa frutex* (*Hibiscus syriacus*), will serve to show the chief peculiarities of this order. The calyx "consists of five sepals, below which is an involucre of six or seven leaflets, which have the appearance

of a second calyx. The corolla is cup-shaped, and consists of five petals, which are close together at the base, and this is peculiar to the genus *Hibiscus*. The capsule is round and somewhat convex, being nearly in the shape of what is called a batch-cake, as shown at c ;

it consists of five carpels grown together, each containing many seeds ; and when ripe, it bursts naturally into five valves, each of which has a dissepiment down the centre. The filaments grow together very curiously, inclosing the styles, and forming a column in the centre of the flower, which is the distinguishing mark of the Malvaceæ. Some of the stamens are shorter than others, and as part of each filament is detached, the anthers form the fringe-like border to the column, shown at *d*. The anthers are kidney-shaped and one-celled, and this is another of the characteristics of the order ; but the styles are terminated by five ball-shaped stigmas, like those of the *Linum*. There are many kinds of *Hibiscus* ; but perhaps the best known are : *H. rosa sinensis*, the species which is so often represented in Chinese drawings, and the petals of which are so astringent, that they are said to be used in China by the men to black their shoes, and by the women to dye their hair ; and the Bladder Ketmia (*H. Trionum*), which takes its English name from its inflated capsule. All the plants belonging to the order Malvaceæ have a central column, round which are placed numerous carpels, which grow together and form a many-celled capsule ; and they all have kidney-shaped, one-celled anthers. They have also always an involucre below the

calyx, but this involucre differs in the different genera. In the genus *Malva*, the involucre consists of three leaflets, which in the common Mallow (*Malva sylvestris*) are oblong. The petals are wedge-shaped, and they are what botanists call auricled; that is, they are set so far apart at the base that light can be seen through them. The stamens are all of nearly the same height, and they form a kind of bunch round the styles, which are pointed. The capsule consists of a circle of woolly-looking carpels growing close together, but so as to be easily detached with a pin, and each fitting into a little groove in the receptacle, in which they are placed. As the seeds ripen, the involucre falls off, but the large loose-looking calyx remains on. There is only one seed in each carpel; but as there are generally eleven carpels in each capsule, each seed-vessel contains this number of seeds. The leaves are lobed and toothed; and the whole plant is covered with long hairs, which are disposed in little star-like tufts.

The genus *Malope* closely resembles the Mallow; except that the petals are not wedge-shaped, and that it has a still larger calyx, the long sepals of which shroud the capsule as the involucre of the filbert does the nut. The involucre is composed of three broad, heart-shaped leaflets, which remain on till the seed is ripe.

The petals are also not so even along the margin ; and the carpels are so disposed as to form a cone-shaped capsule, instead of a flat one.

The genus *Lavatera* has the leaflets of the involucre joined to the middle, so as to form a kind of three-cornered saucer below the capsule ; and the capsule itself is completely covered with a part of the receptacle, which is dilated, and curved down over it. Lastly, the genus *Althæa*, the Marsh Mallow, has the involucre cleft into six or nine divisions, and the carpels united into a globular capsule. The Hollyhock (*A. rosea*) belongs to this genus. Many other genera might be mentioned, but these will suffice to give my readers a general idea of the order, and of the points of difference which distinguish one genus from another. Among the exotic plants belonging to the order is the cotton tree (*Gossypium herbaceum*), the cotton being the woolly matter which envelops the seeds in the capsule. All the Malvacæ abound in mucilage, and they all have woody fibre in their stems.

ORDER XXIX.—BOMBACEÆ.—THE SILK COTTON
TREE TRIBE.

THIS order is closely allied to Malvacæ, and it differs principally in the tube formed by the stamens being divided into five bundles near the top. It includes the Baobab, or Monkey-bread.

(*Adansonia digitata*), said to be the largest tree in the world; the Screw tree (*Helicteres Isora*), so named from its curiously-twisted fruit; *Carolinia princeps*; the Silk Cotton tree (*Bombax Ceiba*); and the Hand-plant (*Cheirostemon platanoides*),—this is the Hand-plant so named from the lobes of its leaves resembling fingers,—all stove plants in Britain.

ORDER XXX.—BYTTNERIACEÆ.—THE BYTTNERIA
TRIBE.

THIS order is divided into five sections, which some botanists make distinct orders. It is very nearly allied to Malvaceæ, but the anthers are two-celled. The principal genus in the first section (*Sterculiæ*) is *Sterculia*, which has several carpels distinct and arranged like a star: the species are trees with large handsome leaves which are articulated at the base, and axillary panicles or racemes of flowers. The second section (*Byttneriæ*) contains among other plants *Theobroma Cacao*, from the fruit and seeds of which Cocoa and Chocolate are prepared. The third section (*Lasiopetaleæ*) is well known in England, by the pretty Australian shrubs included in the genera *Thomasia* and *Lasiopetalum*, the leaves of which have their under surface downy, and generally brown. The fourth section (*Hermaniæ*), and the sixth (*Wallichieæ*), contain no

plant common in English gardens; and the fifth (*Dombeyaceæ*) is best known by *Astrapæa Wallichii*. The qualities of all the plants in this order are mucilaginous.

ORDER XXXI.—TILIACEÆ.—THE LINDEN TRIBE.

THE only genus belonging to the natural order Tiliaceæ which is easily to be procured in Britain is that of *Tilia*, the Lime trees. The common Lime (*Tilia europæa*) is generally a tall, well-formed tree, with rather broad leaves, which are heart-shaped at the base, tapering at the point, and serrated at the margin: they are also smooth on the outer surface, thin, and of a light and delicate texture; below there is a little tuft of hair at the angle of the veins. The flowers are produced in cymes or compound umbels (see *fig.* 120); and their main pedicel appears to spring from one long entire bract (*a*). The calyx is in five sepals, and it falls off before the corolla, which is composed of five pale yellow petals, which are very sweet-scented.



FIG. 120.—THE FLOWERS AND SEED-VESSEL OF THE COMMON LIME TREE.

The stamens are numerous, and the filaments separate, bearing two-celled anthers, which burst by long slits. The ovary has only one style, the tip of which is cleft into five small stigmas; and it is divided into five cells, each containing one or two ovules. The fruit or capsule (*b*) is round, and has a leathery skin, covered with a soft down; and when ripe, the cells often become united so as to form one, with only one or two perfect seeds in the whole capsule, the other ovules proving abortive. The whole plant abounds in mucilage, and the sap when boiled affords sugar. The inner bark is so tough and fibrous, that it is used for making what are called bast mats: it being first rendered flexible by steeping it for a long time in water. The wood is of very fine texture, but soft and white, and it is thus admirably adapted for carving. The American Limes have a small scale at the base of each petal of the flower; but the other differences between the species are very slight.

ORDER XXXII.—ELÆOCARPÆ.—THE ELÆOCARPUS
TRIBE.

EAST INDIA shrubs and trees, little known in Britain. “The hard and wrinkled seeds of *Elæocarpus* are made into necklaces in the East Indies, and, set in gold, are sold in our shops.”—(*Hook.*)

ORDER XXXII*.—DIPTEROCARPÆ.—THE CAMPHOR
TREE TRIBE.

THERE are two kinds of Camphor, one produced by boiling the branches of a kind of laurel, and the other (the Camphor of Sumatra) is found in large pieces in the hollow parts of the branches of *Dryobalanops Camphora*, one of the species included in this order. None of these trees have been introduced into Britain.

ORDER XXXIII.—CHELONACEÆ, OR HUGONIACEÆ.

SMALL trees and shrubs, natives of the East Indies and Madagascar; only the genus *Hugonia* is known in Britain.

ORDER XXXIV.—TERNSTRÖMACEÆ.—THE
TERNSTRÖMIA TRIBE.

THE principal plants in this order common in England are *Gordonia*, *Stuartia*, and *Malachodendron*. *Gordonia Lasianthus*, the Loblolly Bay, is a small evergreen tree, with white flowers, about the size of a rose. It is a native of America; and *Stuartia* and *Malachodendron* are beautiful low trees or shrubs, with large white flowers from the same country. The flowers have five large petals; the stamens are

numerous, with the filaments growing together at the base, and attached to the petals; and there are five carpels more or less connected. *Gordonia* has its five sepals leathery, and covered with a silky down; its stamens almost in five distinct bundles, a five-celled capsule, and its seeds each furnished with a wing. *Stuartia* has a permanent calyx, five-cleft, but not parted into distinct sepals, with two bracts at the base, and a woody five-celled capsule, with seeds without wings; and *Malachodendron* (which was formerly called *Stuartia pentagynia*) has a calyx similar to that of *Stuartia*, but the edges of the petals are curiously crenulated, and there are five distinct carpels, each containing only one seed. Some botanists include the *Camellia* and the *Tea* in the order *Ternstroemiaceæ*.

ORDER XXXV.—CAMELLIACEÆ.—THE CAMELLIA
TRIBE.

THERE are two genera in this order, the *Camellia* and the *Tea*. The flower-bud of the *Camellia* is inclosed in a calyx of five, seven, or nine concave sepals, on the outside of which are several bracts, which remain on till the flower has expanded, but which are distinguished from the sepals by their dark brown colour. The sepals and the bracts are laid over one another

like scales, and thus the flower lies encased in a complete coat of mail. The single flower is cup-shaped, with five, seven, or nine petals, which are sometimes joined together at the base. The stamens have long slender filaments, which either grow together at the base, or are separated into several bundles. The anthers are elliptical and versatile; that is, they are poised so lightly on the filament as to quiver with the slightest breeze. The ovary is of a conical shape, and it has three or five slender styles, ending in as many pointed stigmas, and growing together at the base. The capsule is three or five-celled; and when ripe it bursts into three or five valves, in the middle of each of which is a dissepiment, which, before the capsule opened, was attached to an axis or column in the centre. The seeds are large and few, and they are fixed to the central placenta. There is no albumen, but the embryo has two large, thick, oily cotyledons, which look as if they were jointed at the base. The leaves are leathery, dark-green and shining, and they are ovate in form, ending in a long point, and sharply serrated. The flowers spring from the axils of the leaves, and grow close to the stem without any footstalk; and the leaf-bud for the ensuing shoot grows beside the flower-bud.

I have above described the *Camellia japonica*,

from which nearly all the Camellias in British gardens have sprung; but there are some other species. The finest of these is *C. reticulata*, which has very large, loose, widely-spreading flowers, of a remarkably rich crimson. The leaves are oblong, flat, and reticulately veined, being of a much finer texture than those of *C. japonica*. The ovary is two or four-celled, and it is covered with fine silky hairs. *C. maliflora* is a very beautiful species with small semi-double flowers, coloured like an apple blossom. This Camellia is by some botanists thought to be a variety of *C. Sasanqua*, an elegant species with white fragrant flowers; but the ovary of the first is smooth, and that of the second covered with hairs, which most botanists consider a specific difference.

The Tea tree (*Thea viridis*) is very nearly allied to the Camellia; but there are many points of difference. The flower of the Tea tree has a footstalk; the calyx has only five sepals; the filaments of the stamens do not grow together; the capsules are three-seeded; and the dissepiments are formed by the edges of the valves being bent inwards, instead of being attached to a central axis. The leaves are also much longer than they are broad, and they are of a thinner texture and pale green; and the outside of the capsule, which is furrowed in the Camellia, is

quite smooth in the Tea tree. It is said that both the green and the black Tea are made from the leaves of *Thea viridis*; but there is another species called *Thea Bohea*, which has smaller leaves, and is a more tender, and less vigorous-growing plant. The young leaves of *Camellia Sasanqua*, and some of the other Camellias, are also dried, and mixed with the tea. All these plants are natives of Japan and China, and require a slight protection in England during winter.

ORDER XXXVI.—OLACINEÆ.—THE OLAX TRIBE.

Exotic trees from the East and West-Indies, little known in Britain. *Heistria coccinea*, a native of Martinique, is said to be the Partridge wood of the cabinet-makers.

ORDER XXXVII.—AURANTIACEÆ.—THE ORANGE TRIBE.

THE natural order Aurantiaceæ contains fourteen genera; but the only one I think my readers will feel an interest in is the genus *Citrus*. This genus comprises, among several other species, *C. medica*, the Citron; *C. Limetta*, the sweet Lime; *C. Limonum*, the Lemon; *C. Paradisi*, the Forbidden fruit; *C. decumana*, the Shaddock; *C. Aurantium*, the Sweet Orange;

and *C. vulgaris*, the Bitter or Seville Orange. to these may be added *C. nobilis* the Mandarin Orange, the fruit of which is reddish, and which parts naturally from its rind, which is sweet, and may be eaten. All the species agree in having a tube-like calyx, scalloped into five short teeth, and a flower of generally five fleshy petals, (see *a* in *fig.* 121), though the



FIG. 121.—FLOWER AND SEED OF THE ORANGE.

number occasionally varies from four to nine. These petals are elliptic in shape, concave, and always widely opened. In the centre of the flower are the stamens, varying from twenty (which is the ordinary number) to sixty; the anthers are two-lobed, and oblong, and the filaments are somewhat thickened at the base, and united there into several small bundles (*b*), but free above. The pistil has a somewhat globular ovary, with a cylindrical style, termi-

nating in a stigma, which is slightly raised in the centre. The disk in which the stamens are inserted, forms a ring round the ovary. The fruit (*fig. 122*), which is considered by

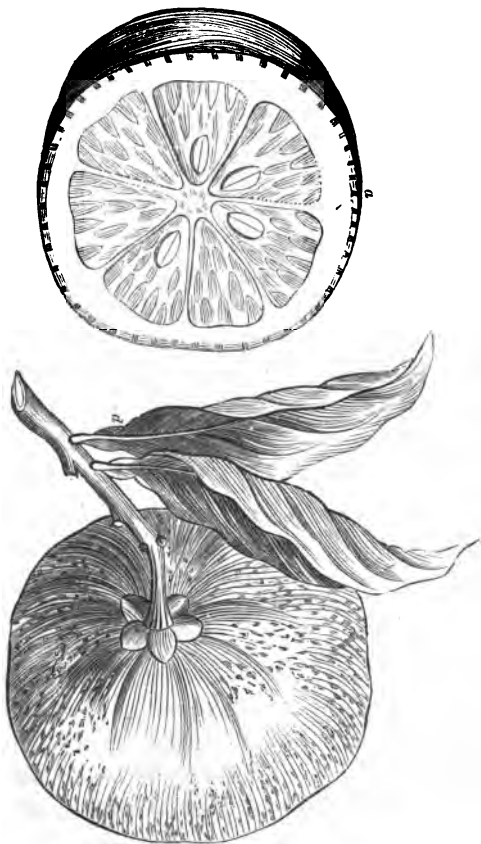


FIG. 122.—LEAF AND FRUIT OF THE ORANGE.

botanists to be a kind of berry, is in fact a seed-vessel with numerous cells, divided by dissepiments and a central placenta (*a*); the cells being the quarters of the Orange, the dissepiments the divisions between them, and the placenta the central pith. When the flower first expands, the ovary, if cut open and examined, will be found to be divided into several cells, each containing two rows of ovules. As in the preceding genera, however, many of these ovules become abortive; and as the cells fill gradually with cellular pulp, the seeds become detached from the placenta, and buried in it. The seeds themselves are very interesting; they are covered with a thick wrinkled skin, and they show distinctly the hilum (*c* in *fig.* 121), the chalaza (*d*) and the raphe or connecting cord between them, parts which are seldom to be distinguished in seeds with the naked eye.

The leaves, calyx, and petals of the Orange, if held up to the light, appear covered with little dots. These dots are cells, covered with a transparent membrane, and filled with a kind of oil, which is exceedingly fragrant. The rind of the fruit is covered with similar cells, filled with a pungent oily liquid. The leaves are smooth and shining; and they are articulated; that is, they can be separated from the petiole or footstalk without lacerating them. In most

of the species, the petioles are winged ; that is, they are dilated into little leaves on each side (see *d* in *fig.* 122). The different species vary chiefly in the number of stamens, the thickness of the rind, the shape of the fruit, and in the wings of the petioles. In the Citron these wings are wanting entirely, and instead of them there are spines in the axils of the leaves ; there are generally forty stamens, and the rind of the fruit is very thick. In the sweet Lime, the petioles are slightly winged, and there are about thirty stamens ; the fruit is small and round, with a slight protuberance at one end like that of the Lemon, and the pulp is sweet. In the Lemon the petioles are somewhat winged, the flowers have about thirty stamens ; the fruit is oblong, with an acid pulp, and a thin rind. The Sweet Orange has winged petioles, about twenty stamens, and a fruit with a thin rind and sweet pulp ; and the Seville Orange differs principally in having a thicker rind and bitter pulp. The China, St. Michael, and Malta Oranges, with many others, are all varieties of the Sweet Orange (*Citrus Aurantium*) ; and there are many other species, which I have not thought it necessary to describe.—All the species above-mentioned are natives of Asia, and most of them of China, but they have been so long cultivated in Europe and America, as to have become almost naturalised.

ORDER XXXVIII.—HYPERICINEÆ.—THE
HYPERICUM TRIBE.

THE genus *Hypericum*, or St. John's Wort, agrees with the orange in having its leaves full of transparent cells; but these cells are filled with a yellow, resinous juice, resembling gamboge in its medicinal properties, and having a very disagreeable smell. There are five petals in the corolla; and the calyx consists of five sepals, which are unequal in size and shape, and joined together for only a short distance. Like the orange the filaments grow together at the base, in separate clusters or bundles; but in the *Hypericum* these clusters are so perfectly distinct, that the stamens may be readily separated into three or five bundles (according to the species), by slightly pulling them. The capsule is dry, and of a membrane-like texture, and it consists of three or five carpels; containing many seeds, and each having a separate style, and a pointed stigma. The flowers are very showy, from their large golden yellow petals and numerous stamens. The genus *Androsæmum*, the Tutsan, or Park-leaves, has been separated from *Hypericum* on account of its fruit being one-celled and one-seeded, with a fleshy covering, which yields a red juice when pressed. *H. calycinum*, with large yellow flowers and five

tufts of stamens, is the handsomest species ; but *H. perforatum* is the true St. John's Wort, which the country people used formerly to gather on midsummer eve, as a preservative against witchcraft.

ORDER XXXIX.—GUTTIFERÆ.—THE MANGOSTEEN
TRIBE.

THE only genus in this order that contains plants interesting to the English reader is *Garcinia* ; and the most remarkable species are *G. Mangostana*, the Mangosteen, said to be the most delicious fruit in the world, and *G. Cambogia*, the tree producing the gamboge, which is a kind of gum that oozes out from the stem. Both are natives of the East Indies.

ORDER XL.—MARCGRAAVIACEÆ.

Exotic shrubs, mostly natives of the West Indies, with spiked, or umbellate flowers, and alternate leaves. Very seldom seen in Britain.

ORDER XLI.—HIPPOCRATACEÆ.

Exotic arborescent, or climbing shrubs, generally with inconspicuous flowers. Natives of the East and West Indies.

ORDER XLII.—ERYTHROXYLÆ.—THE RED WOOD TRIBE.

Exotic shrubs, and low trees, remarkable from the redness of their wood, but with small greenish flowers. The leaves of *Erythroxylon Coca* possess an intoxicating quality, and are chewed by the Peruvians, in the same manner as the Turks take opium.

ORDER XLIII.—MALPIGHIACEÆ.—THE BARBADOES CHERRY TRIBE.

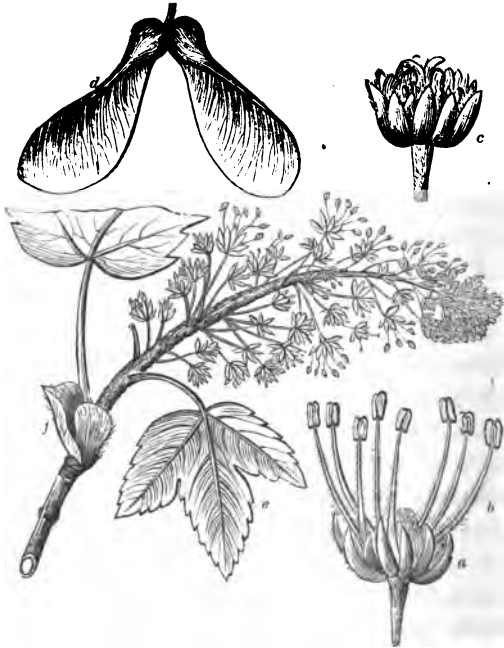
SEVERAL species of *Malpighia*, the Barbadoes Cherry, are found occasionally in our stoves. The corolla of these plants, when closed, bears considerable resemblance to that of a *Kalmia*; but the flower when expanded is more like that of a *Clarkia*, from the long claws of the five petals, and the distance they are placed apart. Several of the species have their leaves and stems beset with stinging bristles, which adhere to the hands when touched. The fruit, which is eatable, but insipid, is a berry-like drupe, containing three one-seeded nuts. The species are natives of the West Indies, and they require a stove in England. The flowers are generally rose-coloured or purplish; but they are sometimes yellow. The common Barbadoes Cherry

is called *M. glabra*, and its leaves are without stings. In Hiptage, another genus of this order, four of the petals of the flowers are white, and one yellow; and in Banisteria, the species are generally climbing shrubs, always with yellow flowers. Some of the species of Banisteria are occasionally found in stoves in this country, where their beautiful feathery yellow flowers have very much the appearance of those of the Canary bird flower (*Tropæolum peregrinum*).

ORDER XLIV.—ACERINEÆ.—THE MAPLE TRIBE.

THE common Maple (*Acer campestre*) and the Sycamore (*A. Pseudo-Platanus*) are the only plants belonging to this order, that are natives of Britain; though so many kinds of ornamental Acers are now found in our parks and pleasure-grounds. Few trees are indeed more deserving of culture than the American Maples, both for their beauty in early spring, and for the rich shades of yellow and brown which their leaves assume in autumn. The Maple tribe is a very small one; it consists indeed of only the genera Acer and Negundo, and an obscure Nepal genus, of which there are no plants in Britain. Of all the Acers, one of the handsomest is the Sycamore tree (*A.*

Pseudo-Platanus) ; the flower of this species (see *c* in *fig.* 123) is of a yellowish green ; and as in early spring, when it appears, we are delighted



123.—FLOWER AND SAMARA OF THE SYCAMORE. (*Acer Pseudo-Platanus*.)

at the sight of any thing in the way of flowers, it really looks very beautiful. Before I began to study botany, I had never noticed the blossoms of the forest trees, and when I was shown the

light-feathery flowers of the Lime, and the gracefully-drooping ones of the Sycamore, I was quite astonished. The flowers of the Sycamore grow in a drooping raceme; the calyx is divided into five parts, but as it is scarcely distinguishable from the petals, which are five in number, and placed alternately with the sepals, it appears to be in ten divisions (see *a*). These flowers are partly male and female (see *b* and *c*), and partly perfect. In the perfect flowers there are eight stamens, and two stigmas; and the ovary when ripe expands into a curiously winged pod, called a samara (*d*), but differently shaped to the samara of the Ash, the thickened parts at the base of which contain the seeds. There is no albumen in the seed, which, when put into the ground, expands into two long thin cotyledons, (*a* in *fig.* 124) which, if once pointed out, will always be known again instantly. If a ripe seed be opened when quite fresh, the cotyledons or seed leaves will be found within it, fresh, green, and succulent; and these leaves (*a* in *fig.* 124), which rise above the ground as soon as the seed begins to germinate, differ widely in shape from the true leaves (*b*) which are serrated, and of a much thicker texture. The bracts of the Sycamore (*f* in *fig.* 123) are thick and leathery, and of a rich dark brown. The leaves are serrated at the margin;

and the lower ones are cut into five lobes ; but those near the flowers have generally only three



FIG. 124.—YOUNG SYCAMORE.

lobes (*e*), and in all the leaves, two of the lobes are not so deeply cut as the others.

There are many species of *Acer*, most of which are tall trees; and they are chiefly distinguished from each other by the shape of the leaves and of the samaras, or keys, the wings of which, in some species, are near together, as shown at *d* in *fig.* 123, and in others widely apart, as in the common hedge Maple (*A. campestris*), and in the Norway Maples, as shown at *a* in *fig.* 125. This figure represents the flowers of the Norway Maple (*Acer platanoides*), which are in what botanists call a corymb, and stand erect, instead of drooping like those of the sycamore. The leaves are deeply five-lobed, and the lobes are so coarsely toothed, that the teeth have almost the appearance of lobules. The buds of this plant in winter are large and red, and when they open in spring, the bracts (*b*) curl back over the scales (*c*). The leaves become of a clear yellowish red in autumn, and the whole plant is very ornamental. When a leaf of this tree is broken off, a milky sap issues from the broken petiole or leaf-stalk, which is of an acrid nature; differing in this respect, materially from the sap of the trunk, which is very sweet. Sugar indeed may be made from the sap of the trunk of almost all the Maples; but particularly in America, from that of the Sugar

Maple (*Acer saccharinum*). The flowers of the red American Maple (*Acer rubrum*) are red, and as from their colour, and their appearing a fortnight before the leaves, they are very conspicuous, I have given a magnified representation of them in *fig. 126*, that my readers may have an opportunity of examining the male



FIG. 125.—FLOWERS AND SAMARA OF THE NORWAY MAPLE.

and female flowers from a living tree. In *fig.* 126, *a a* are male flowers, having no stigmas; and *b b* are female ones, having no stamens.

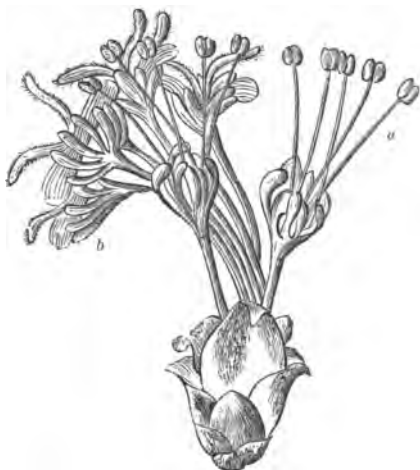


FIG. 126.—FLOWERS OF THE RED MAPLE (*Acer rubrum*).

The leaves of *Acer rubrum* become red in autumn. The Tatarian Maple differs from the other species in having entire leaves, and the samaras are red when young; but all the other kinds of *Acer* common in British gardens bear a strong family likeness to each other. The Ash-leaved Maple is now made into a separate genus, and is called *Negundo fraxinifolia*. This tree is easily distinguished from the Maples by its compound leaves, which resemble those of

the Ash, and its long pea-green shoots, which have very few buds. The male and female flowers of the Negundo are on different trees, and they are so small as to be seldom seen, though the racemes of samaras or keys which succeed the flowers are very conspicuous. The Negundo is a native of America, and its leaves turn yellow in autumn.

ORDER XLV.—HIPPOCASTANEÆ, OR ÆSCULACEÆ.
THE HORSE-CHESTNUT TRIBE.

THIS order contains only two genera; viz., *Æsculus*, the Horse-chestnut, and *Pavia*, the Buckeye; both of which are generally called Horse-chestnuts, though the genera are easily distinguished by their fruit, the husk of which is smooth in the *Pavias*, but rough in the true Horse-chestnuts. The buds of all the species of both genera are covered with bracted scales, most of which fall off when the leaves and flowers expand; and those of the common Horse-chestnut (*Æsculus Hippocastanum*) are very large, and covered with a kind of gum. Four large compound leaves, each consisting of five or seven leaflets, and a raceme of sixty-eight flowers, have been unfolded on dissecting one of these buds, before the leaves unfold in spring. The flowers of this species are produced in large, upright

panicled racemes (see *a* in *fig.* 127) ; and the leaves (*b*) are compound, consisting of five or



FIG. 127.—FLOWERS OF THE HORSE-CHESTNUT.

seven leaflets, disposed in a palmate manner. Two of the inner bracts, which remain after the outer scales (which are very numerous) have fallen, are shown at *c*. I mention this particularly, as these remaining bracts have very much the appearance of stipules, and it is one of the characters of the Horse-chestnuts that their leaves are without stipules. The flowers consist of five petals, two of which (*d* in *fig.* 128) are somewhat smaller than the others. Each petal consists of a broad blade or limb

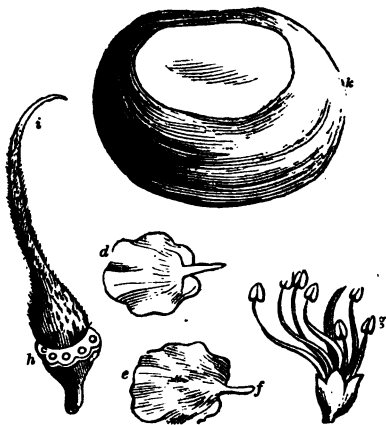


FIG. 128.—HORSE-CHESTNUT.

(*e*), and a very narrow claw (*f*). There are seven stamens, three of which (*g*) are shorter than the others. The filaments are inserted in

the receptacle (*h*), and surround the pistil, which is hairy, and has a long style and a curved stigma (*i*). The ovary is two-celled, and each cell contains two ovules, but seldom more than one seed ripens. The nut (*k*) is large, and covered with a shining brown skin, which is strongly marked with the hilum. When put into the ground, the cotyledons do not appear in the shape of seed-leaves, but remain in the ground, and the plumule and radicle are protruded as shown in *fig. 129*. The Acorn germinates in a similar manner, as already shown in *fig. 86* in p. 192.



FIG. 129.—YOUNG PLANT OF HORSE-CHESTNUT.

The flowers of the different species of *Æsculus* vary considerably; as, for example, in the Scarlet Horse-chestnut (*Æ. rubicunda*), the calyx is tubular (see *a* in *fig. 130*), and there are but four petals, the upper two of which (*b*) are narrower than the lower ones (*c*), and have bearded

claws. This species has sometimes eight stamens. In the Yellow Horse-chestnut, or yellow

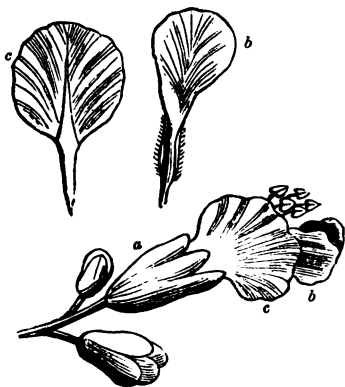


FIG. 130.—SCARLET HORSE-CHESTNUT.



FIG. 131.—YELLOW HORSE-CHESTNUT.

flowered American Buckeye, the upper petals (*a* in *fig.* 131) are very much smaller than the lower ones (*b*), and both have very long claws. There are four petals, which conceal the stamens, of which there are frequently only six. The seed of *Pavia* has only a small hilum, which resembles the pupil of an eye (see *fig.* 132); and hence the genus has received its American name of Buckeye. In one species (*P.*

macrostachya), the nut is eatable, and very much resembles that of a Sweet Chestnut when boiled in milk. The stamens



FIG. 132.—NUT OF THE
BUCKEYE.

in this species are much longer than the petals, and they give a peculiarly light and elegant appearance to the flowers; which, unlike those of the other species, do not appear till the latter end of summer or autumn.

ORDER XLVI.—RHIZOBOLÆ.—THE CARYOCAR
TRIBE.

TREES of large size, natives of tropical America. *Caryocar nuciferum* produces the Suwarow, or Butter-nut of the fruiterers' shops.

ORDER XLVII.—SAPINDACEÆ.—SOAP-TREE TRIBE.

THE only plant in this order which will grow in the open air in England is *Kölreuteria paniculata*, a beautiful tree, with very elegant leaves, and panicles of yellow flowers, which are succeeded by a bladdery capsule, which is divided into three cells in its lower part, though it is only one-celled above. The rind and pulp of the fruit of *Sapindus Saponaria* are used as

soap in those countries of which it is a native. The nuts of this plant are round and hard, and of such a shining black that they are made into buttons and beads by the inhabitants of Spanish America. The whole plant, if thrown into ponds containing fish, will intoxicate, and sometimes kill them. Another interesting plant belonging to this order is the Chinese fruit called Litchi (*Euphoria* or *Nephelium Litchi*) ; which has its sweet eatable pulp enclosed in a kind of nut, much wrinkled on the outside ; so that the fruit lies within the stone, instead of being on the outside of it. These hard, stone-like berries grow in loose racemes.

ORDER XLVIII.—MELIACEÆ.—THE BEAD-TREE
TRIBE.

Melia Azederach, the Pride of India, or Indian Lilac, or Bead-tree, for it is known by all these names, is a native of Syria, which has become almost naturalised in the South of Europe, particularly near the Mediterranean. The leaves are bi-pinnate, the flowers are violet-coloured, and the fruit, which resembles that of the cherry, is of a pale yellow when ripe. The pulp is poisonous, and the stones are used for making rosaries in the Roman Catholic countries.

ORDER XLVIII*.—CEDRELEÆ.—THE MAHOGANY
TRIBE.

THIS order was at first united to Meliaceæ by De Candolle, but it has been separated on account of its winged seeds. It contains, among other genera, the Mahogany tree (*Swietenia Mahagoni*), and the West Indian Cedar (*Cedrela*). The leaves of these trees are alternate and pinnate, with unequal-sided leaflets; and the flowers are in large spreading panicles composed of numerous little cymes. The fruit is capsular, and the seeds are winged. The genera contained in this order, all require a stove in Great Britain.

ORDER XLIX.—AMPELIDEÆ.—THE VINE TRIBE.

THE natural order Ampelideæ contains several genera, but of these only the Vine and the five-leaved Ivy are common in British gardens. It seems almost ridiculous to talk of the flowers of the Vine, as the bunches, even when they first appear, seem to consist of only very small grapes, which gradually become large ones. The flowers, however, though small and insignificant, are perfect, and they have each a distinct and regularly formed calyx and corolla. The calyx of the common Grape (*Vitis vinifera*) is very small, and remains on till the fruit is

ripe ; there are five petals (*a* in *fig.* 133), which never expand, but remain fastened together at the tip, detaching themselves at the base, when

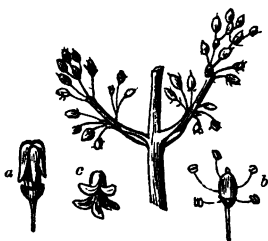


FIG. 133.—FLOWERS OF THE VINE.

it is necessary that they should give room to the ripening stamens (*b*). The petals, which form a kind of extinguisher, when they are raised by the five stamens, fall off

(*c*), and occasion the chaffy appearance observable in clusters of Vine-flowers. The ovary is, when young, in two cells, each containing two seeds ; and it is crowned with a nearly flat, round stigma, without any style. When the fruit begins to swell, the ovary becomes filled with a pulp, which is solid, and not contained in bags like that of the Orange ; and the dissepiment that divided the two cells gradually wastes away. Two, and sometimes three of the seeds also frequently disappear, so that four seeds are rarely found in the ripe grape. The seeds themselves are bony, and covered with a jelly-like matter ; and when they are cut open, they are found to consist of a large quantity of hard albumen, with a very small embryo at the tip. The Vine is a climbing shrub, with lobed leaves, which

are frequently deeply cut ; the bunches in which the grapes are disposed are called branched or thyrsoid racemes (see 137), and the tendrils, by which the plant climbs, are supposed to be abortive peduncles, drawn out into these long, flexible, curling bodies, instead of producing bunches of grapes. The footstalks of the leaves are articulated, and will separate from the branch without tearing them. The different species of vines differ from each other chiefly in their leaves ; but in the American grapes the calyx is sometimes entire, and sometimes the stamens and pistils are in different flowers.

The five-leaved Ivy, or Virginian Creeper (*Ampelopsis hederacea*), differs very little from the Vine in the botanical construction of its flowers. The calyx is, however, almost entire, and the five petals separate in the same way as those of other flowers ; but in other respects they closely resemble those of the Vines. The berries are small, and not palatable, though they might be eaten with perfect safety. The leaves are palmate, and they are divided into three or five stalked leaflets. The stems are climbing and rooting ; and the leaves take a beautiful deep red in autumn. The genus *Cissus* also belongs to this order.

ORDER L.—GERANIACEÆ.—THE GERANIUM TRIBE.

THE order Geraniaceæ contains several genera of well-known plants, the most popular of which are *Pelargonium*, *Erodium*, and *Geranium*, signifying Stork's-bill, Heron's-bill, and Crane's-bill, which differ very slightly from each other. The greenhouse Geraniums, which are all either natives of the Cape of Good Hope, or hybrids raised in Europe from the species originally imported, were, till lately, all included in the genus *Pelargonium*; but what were sections of that genus have, by some botanists, been now made separate genera. As probably, however, this rage for giving new and different names to divisions and subdivisions will not be generally adopted, I will not trouble my readers with any other distinctions than those between the three leading genera; and even these, I think they will allow, appear very trifling. The calyx of the *Pelargonium* is in five sepals, and two of them end in a kind of spur; which is, however, not very perceptible, as it runs down the peduncle or footstalk of the flower, and grows to it, so as to seem only a part accidentally enlarged. The corolla is in five petals, the upper two of which are generally larger, and differently marked to the others. Sometimes there are only four, and sometimes there are six petals;

but these are exceptions to the general rule. The perfect stamens vary in number from four to seven; but there are always ten filaments, which are dilated, and grow together at the base; and I was quite delighted with the sparkling gem-like appearance of the membrane which they form when thus united, when I looked at it through my little microscope. In the plant now before me (a hybrid called the Duke of Sussex), the upper parts of some of the stamens have turned into little petals, retaining the white membrane-like part at the base, and thus curiously exemplifying the manner in which double flowers are formed, which is always by the metamorphosis of the stamens, or of the stamens and pistil, into petals. The pistil of the *Pelargonium* appears, when young, to consist of a five-celled ovary, with a long slender style, the tip of which is divided into five slender curved stigmas. The cells of the ovary are, however, five one-seeded carpels, each having a separate style; and though both the carpels and styles appear firmly grown together when young, yet, in fact, they only adhere to an elongation of the receptacle (see *a* in *fig.* 134), which is here called the central axis, and from which, when ripe, they part with elasticity, and curl up, as shown at *b*; the styles, or awns, as they are sometimes called, being hairy inside.

The shape of the unripe seed-vessel, with its persistent calyx, is shown at *c*, and a detached seed at *d*.



FIG. 134.—SEED-VESSEL OF A PELARGONIUM.

No plant hybridises more freely than the *Pelargonium*; and thus, the number of new kinds raised every year defies all description, and they have been so mixed and intermixed with each other, that it is

not easy to say to what species the most splendid hybrids are allied. A few species, however, remain nearly unchanged, and the best known of these are *P. zonale*, the Horse-shoe Geranium; *P. inquinans*, the common scarlet, the juice of the leaves of which is said to stain the fingers brown; *P. graveolens*, and *P. capitatum*, the rose-scented Geraniums, and *P. tricolor*. All the *Pelargoniums* have their flowers in heads or umbels; and the calyx in all of them remains on till the seeds are ripe. The seed-vessel, or fruit, as it is called by botanists, is long and pointed, forming some resemblance to the head of a stork; the ovary shrouded in the persistent calyx, representing the head

of the bird, and the long styles the beak. The leaves vary in shape in the different kinds: sometimes they are roundish, as in the Horse-shoe Geranium, and marked with a dark band or zone, whence the specific name *zonale*; and sometimes they are deeply cut, as in the rose-scented kinds: some are shrubby, and some herbaceous; and the stems of some species are warted, and the roots of others tuberous.

The genus *Erodium* consists principally of European plants, three of which are natives of England. The commonest of these (*Erodium cicutarium*) is called in many parts of England the Wild Geranium; and nearly allied to it, but less common, is *E. moschatum*. The principal points in which this genus differs from *Pelargonium* are, that the filaments of the stamens are very little united at the base; that there are always five filaments which bear anthers, and five that are sterile, and that the latter have each a gland at the base. The calyx is also without the spur, and the seed-pod is thought to resemble a heron's head more than that of a stork. When it bursts, also, the styles, which are hairy inside like those of the *Pelargonium*, do not curl up in the same manner as in that genus, but spirally.

The genus *Geranium* differs from *Erodium* principally in having the stamens all perfect;

but the alternate ones are longer than the others, and have a gland at the base of each. The seed-pod is said to resemble the head of a crane, and when it bursts, the styles, which are smooth inside, curl up round and round like the coil of a rope. The seeds of many of the kinds are beautifully netted. Many of the species are British weeds, and among the commonest of these may be mentioned Herb Robert (*Geranium Robertianum*), and the Meadow Crane's-bill (*G. pratense*). Dr. Lindley, in his Ladies' Botany, mentions a curious and beautiful experiment which may be performed by pressing the petals of a Geranium between two pieces of glass which have been previously wetted. He says, that by pressing the two glasses firmly together, all the air may be squeezed out of the petal, and it will become transparent. "You may then," he adds, "with a pretty good magnifying power, observe all the air-vessels of the veins distinctly, looking like fine threads of silver-wire twisted up like a spiral spring. It is on account of this appearance that the air-vessels are called, technically, spiral vessels." The experiment appeared to me so easy, and at the same time so interesting, that I tried it, but unfortunately without success; probably owing to the want of power in my microscope.

ORDER LI*.—LIMNANTHEÆ.

THIS little order contains only one plant, *Limnanthes Douglassi*, a pretty Californian annual, with yellow and white flowers. It resembles Geraniaceæ in its botanical construction, but it does not discharge its seeds with elasticity.

ORDER LI.—TROPÆOLACEÆ.—THE NASTURTIIUM :
TRIBE.

THE well-known flowers called Nasturtium, or Indian Cress, give their name to this order ; which, in fact, consists only of the genus *Tropæolum*, and an obscure genus not yet introduced. In the flowers of the Nasturtium, the calyx and corolla are of nearly the same colour, but they may be easily distinguished from each other. The calyx is drawn out into a spur behind, and the petals, which are unguiculate, or claw-shaped, are fringed at the base. The leaves and stem are succulent, and have the taste of cress, and hence the plant has received its popular name,—Nasturtium being the botanic name of the water-cress. The *Tropæolum* has five petals, eight stamens, and three carpels, which are joined together into a trigonal fruit, each carpel containing one seed, which adheres to it. The embryo is large, and fills the whole

seed, which is without albumen. The unripe carpels are sometimes pickled, and used as a substitute for capers. The whole plant has not only the taste, but the properties, of cruciferous plants; and even the caterpillars of the cabbage-butterflies feed upon it.

ORDER LII.—BALSAMINEÆ.—BALSAM TRIBE.

NEARLY allied to the Geraniums, and resembling them, in the opening of the seed-pods, are the beautiful plants contained in the order Balsamineæ. The two genera best known in British gardens are *Balsamina* and *Impatiens*. The common Balsam (*Balsamina hortensis*), has a small green calyx of two sepals; there are four petals, one of which is drawn out into a short spur at the base. There are five stamens, each bearing a two-celled anther. The ovary is one-celled, but it separates into five valves, when the seeds are ripe, bursting with elasticity, and the valves curling inwardly from the apex to the base. There are five stigmas, quite distinct from each other, and appearing just above the ovary, without any style; and the peduncles are simple and one-flowered.

The genus *Impatiens*, which contains the common Noli-me-tangere, or Touch-me-Not, and other similar plants, though it agrees with

Balsamina in having five anthers, has only three of them with two cells, the others having one cell each. The stigmas also are joined together at the base, and the capsule bursts at the slightest touch, the valves coiling up spirally from the base to the apex, and detaching themselves from the plant at the same time that they expel the seeds. The peduncles grow from the axils of the leaves, and they are branched and many-flowered. A separate order, called Hydrocereæ, has been made of one of the species of *Impatiens* (*I. natans*). It is an aquatic plant, a native of the East Indies.

ORDER LIII.—OXALIDÆ.—THE WOOD-SORREL
TRIBE.

THE flowers of all the species of *Oxalis*, the Wood-sorrel, are very pretty. The flowers have five regular petals, each furnished with a claw; and the petals are spirally twisted in the bud. There are ten stamens, and five styles. The capsule is five-celled, and five or ten valved, the valves opening lengthways. Most of the species are natives of South America, and greenhouse plants in England.

ORDER LIV.—ZYGOPHYLLÆ.—THE BEAN-CAPER
TRIBE

THE flowers of the Bean-caper are usually yellow; and the five petals are long, narrow, and placed widely apart. The botanic name of *Zygophyllum* signifies “with the leaves in pairs,” and this is the case to a remarkable degree. *Fagonia cretica* is a very pretty plant, with purple flowers very much like those of *Clarkia*; and *Guaiacum*, the *Lignum Vitæ*, is remarkable for the hardness of its wood and the gum it produces. *Melianthus* belongs to this order.

ORDER LV.—RUTACEÆ.—THE RUE TRIBE

THIS order has been divided into four sections; three of which contain well-known plants, and have been divided into three orders by many botanists. The Rue (*Ruta graveolens*) is well known from its strong and disagreeable smell, which is produced by the oil secreted in transparent cells in the leaves, which have the appearance of dots, when the leaves are held up to the light. The leaves are of a bluish green, and the flowers of a greenish yellow; the latter growing in cymes at the end of the branches. There are four sepals, four petals, and eight stamens. There are four carpels, seated on an elevated receptacle, and each containing one cell,

which grow into a four-celled fruit. In *Fraxinella* (*Dictamnus*) the petals are unequal; there are ten stamens, one style, and the carpels are two-seeded. In *Diosma* there are only five stamens, the style is arched, and the capsule consists of five-horned carpels. In *Corræa* the leaves are opposite; there are eight stamens, and the four petals grow together into a tube at the base; and in *Crowea* there are five sepals, five petals, and ten stamens; the leaves are also alternate. The *Diosmas* have as strong a scent as the Rue, and a perfume is made from them called Bucku at the Cape of Good Hope, of which country they are natives.

The section *Zanthoxyleæ* contains the *Zanthoxylum*, also called the Toothache Tree, or Prickly Ash, a native of North America, the bark of which is very fragrant, and is said to be a cure for toothache and rheumatism; *Ptelea* or Shrubby Trefoil; and *Ailantus glandulosa*. *Zanthoxylum fraxineum* has very pretty pinnate leaves, and small purple flowers; *Ptelea trifoliata* has curiously winged fruit, which resemble those of the elm; and the *Ailantus* has remarkably long compound leaves, one leaf having been known to have fourteen pairs of leaflets, and to be upwards of three feet long. The two following orders are included in Rutaceæ by some botanists.

ORDER LVI.—SIMARUBACEÆ.

Quassia amara, the bark of which is sometimes used as a substitute for hops, is perhaps the best known plant belonging to this order. All the species are trees or shrubs, natives of tropical America, with bitter bark, milky juice, and pinnated leaves.

ORDER LVII.—OCHNACEÆ.

TROPICAL shrubs with yellow flowers and shining leaves; seldom seen in British hot-houses.

ORDER LVIII.—CORIARÆ.

ONLY one species of this order is common in British gardens, viz. *Coriaria myrtifolia*; the leaves of which are astringent, and used in dyeing black, and the berries are poisonous.

§ II.—CALYCIFLORÆ.

The plants comprised in this division have their petals and stamens inserted in the calyx, or in a lining of it formed by the dilated receptacle.

ORDER LIX.—CELASTRINEÆ.

THIS order is divided into three sections, each containing well-known plants. The first of these takes its name from *Staphylæa pinnata*, the Bladder-nut. In the flowers of this plant the calyx is in five divisions, and white tinged with pink, so as to be scarcely distinguishable from the corolla. There are two or three carpels, which are surrounded by the receptacle, and the styles of which adhere slightly together. The capsule is bladdery, and consists of two or three cells, each containing one smooth, brownish, bony seed, which looks as though one end had been cut off at the hilum. The leaves are compound, each having five leaflets. The second section contains, among other plants, the Spindle-tree (*Euonymus europæus*), Cassine, and the Staff tree (*Celastrus scandens*). The *Euonymus* has small whitish-green inconspicuous flowers; but it is remarkable for the beauty of its capsules, which are fleshy, and of a bright rose-colour, while the seeds, which are of a bright orange, are enwrapped in a covering called an aril, by which they remain attached to the capsule after the valves have opened. Each capsule has five cells and five seeds, and each seed has a little white stalk attached to its aril, like the funicle of a pea. There are several

species. The *Celastrus* is a climbing shrub, remarkable for its clusters of flowers, but which has nothing else to recommend it. The third section, *Aquifoliaceæ*, is made a separate order; under the name of *Ilicineæ*, or *Aquifoliaceæ*, by many botanists; some of whom place it in the sub-class *Corollæfloræ*, because the petals are connected at the base. The most common plants that it contains are included in the genera *Ilex* and *Prinos*. In *Ilex aquifolium*, the Holly, the corolla (*a* in *fig.* 135), is in four or five petals



FIG. 135.—THE HOLLY.

connected at the base; there are four stamens, the cells of the anthers of which adhere to the sides of the filament (*b*). The berry (*c*) is four-

celled, each cell containing a one-seeded nut. The leaves (*d*) are simple, and smooth, shining and prickly at the edges, which are curved upwards. Prinos, the Winter-berry, is a little evergreen shrub, with red berries.

ORDER LX.—RHAMNACEÆ.

THE most interesting genera in this order are *Paliurus*, *Zizyphus*, *Rhamnus*, and *Ceanothus*. Christ's Thorn (*Paliurus aculeatus*) is easily known by its crooked prickly stem, and its singular fruit, which, from its resembling a head with a broad flat hat on, the French call, *Porte-chapeau*. The flowers are yellow, but they are too small to be ornamental. *Zizyphus Jujuba* differs from *Paliurus* chiefly in its fruit, which resembles a small plum, and from the fruit of which the Jujube lozenges are made. There are numerous species of *Rhamnus*, some of which are trailing-shrubs, and others low trees. Some of the species, such as *R. Alaternus*, are evergreen shrubs, very useful in town-gardens, as they are not injured by smoke; others, such as the Purging Buckthorn (*R. catharticus*), have deciduous, rough, feather-nerved leaves, and the branchlets terminating in a thorn. The berries of the plants in this division are sold for dyeing yellow, under the name of

French or Avignon berries. Another division includes the species which are without thorns. All these plants have their male and female flowers distinct. The last division of *Rhamnus* has perfect flowers, and dark-purple berries, as for example, the Berry-bearing Alder (*R. frangula*). The genus *Ceanothus* is well known from the beautiful *C. azureus*. The other species have generally the same kind of terminal, upright panicles of feathery flowers, but they are very inferior in beauty. *C. americanus*, which has white flowers, is sometimes called American Red-root, or New Jersey Tea.

ORDER LXI.—BRUNIACEÆ.

SMALL heath-like shrubs, natives of the Cape of Good Hope.

ORDER LXII.—SAMYDEÆ.

TROPICAL shrubs or trees with dotted leaves, and inconspicuous flowers.

ORDER LXIII.—HOMALINEÆ.

THIS order contains the handsome evergreen half-hardy shrub, *Aristotelia Macqui*; the flowers are insignificant, but the berries are

black, acid, and eatable, and the leaves are smooth, shining, and so abundant as to render the plant an excellent screen.

ORDER LXIV.—CHAILLETIACEÆ.

AFRICAN plants, with panicles of small white flowers, and simple leaves.

ORDER LXV.—AQUILARINÆ.

TREES, natives of Asia, little known in England.

ORDER LXVI.—TEREBINTHACEÆ.—THE
TURPENTINE TRIBE.

THIS order is divided by De Candolle into seven sections; viz., 1. Anacardiaceæ, including the Cashew-nut (*Anacardium*), the Mango (*Mangifera*), and the Turpentine trees (*Pistacia*); 2. Sumachineæ, which contains *Rhus*, *Schinus*, and *Duraoia*; 3, Spondiaceæ, containing the Hog-plum (*Spondias*); 4. Burseraceæ, including the Jamaica Birch (*Bursera*), and the Balm of Gilead tree (*Balsamodendron*); 5. Amyridæ, the West Indian Balsam tree (*Amyris*); 6. *Spatheliaceæ*, the West Indian Sumach (*Spathelia*); and 7. Connaraceæ,

containing *Omphalobium*, and other exotic genera. Of these modern botanists make five distinct orders, viz., *Anacardiaceæ*, including the first, second, and fifth sections; *Amyrideæ*, *Spondiaceæ*, *Burseraceæ*, and *Connaraceæ*. *Ptelea*, which was originally included in this order, is now generally placed in *Xanthoxylaceæ*.

The plants contained in this order have in some cases perfect flowers, and in others, the male and female flowers on different plants. They all abound in a resinous gum; that from the Mastic tree (*Pistacia Lentiscum*), and several of the species of *Rhus*, is used for making varnish; the gum of the Turpentine tree (*P. Terebinthus*) is the Chian or Cyprus turpentine. The flowers are small, and generally produced in panicles, the petals are sometimes wanting. The leaves are alternate, without stipules, and often compound. The flowers have generally five petals, and five or ten stamens; and the fruit is drupaceous, or capsular, varying in the different genera. In *Anacardium*, the peduncle which supports the Cashew-nut is fleshy and pear-shaped, so as to resemble a fruit more than the nut itself. The Mango has a fleshy drupe, with a woody, fibrous stone or nut. In *Pistacia*, the fruit is a dry drupe inclosing a nut, which is eatable in *P. vera*. Both the male and female flowers in this genus

are handsome, though without petals, from the anthers being yellow, and the stigmas crimson. The different species of Sumach, or *Rhus*, are all poisonous; and the Venetian Sumach (*Rhus cotinus*) is remarkable from the appearance presented by its flower-stalks in autumn; as all the flower-stalks which do not bear fruit dilate, after the flowers have dropped, and become covered with a great quantity of white cottony hair, which makes each panicle resemble a powdered wig; and hence, the French call the tree *Arbre à perruque*.

ORDER LXVII.—LEGUMINOSÆ.—(SEE CHAP. II.
IN P. 35.)

THE plants belonging to this order have alternate leaves, which are generally compound, and frequently have the common petiole tumid; they have also two stipules at the base of the petiole, and frequently two others to each leaflet. The pedicels are usually articulated, and the flowers are furnished with small bracts. The flowers have a five-parted calyx, and a corolla, sometimes papilionaceous, and sometimes spreading, which has never more than five petals, though it has frequently less. The fruit is a legume, though sometimes, when there is only one seed, it has the appearance of a drupe.

There are eleven sections given in De Candolle's *Prodromus*, viz., 1. *Sophoreæ*, the *Sophora* tribe; 2. *Loteæ*, the *Lotus* tribe; 3. *Hedysareæ*, the *Sainfoin* tribe; 4. *Vicieæ*, the *Vetch* tribe, (including the *Pea* and *Bean*); 5. *Phaseoleæ*, the *Kidney-bean* tribe; 6. *Dalbergia*, the *Gum-dragon* tribe; 7. *Swartzia*; 8. *Mimoseæ*, the *Mimosa* tribe; 9. *Geoffrea*, the *Earth-nut* tribe, (including the *Earth-nut Arachis*, and the *Tonquin Bean, Dipterix*); 10. *Cassieæ*, the *Cassia* tribe; and 11. *Detarieæ*. Some botanists include *Moringa*, the *Horse-radish tree*, in *Leguminosæ*, but others make it a separate order under the name of *Moringeæ*.

ORDER LXVIII.—ROSACEÆ.—(SEE CHAP. III. IN P. 50.)

THE flowers have five sepals, combined in their lower part into a tube, but divided above into five lobes; and the corolla has generally five petals. There are numerous carpels, which are usually inclosed in the fleshy tube of the calyx. The ovary is one-celled, and there is seldom more than one seed, and scarcely ever more than two. The leaves are alternate, generally compound, and always furnished with stipules. De Candolle divides the order into eight tribes, viz., 1. *Chrysobalanæ*; 2. *Amygda-*

lineæ ; 3. *Spiraceæ* ; 4. *Neuradææ* ; 5. *Dryadææ*, or *Potentillææ* ; 6. *Sanguisorbeææ* ; 7. *Rosææ* ; and 8. *Pomaceææ*. Of these, the first, second, third, and eight, are made separate orders ; the fifth, sixth, and seventh are retained in *Rosaceææ*. *Neuradææ* was first removed to *Ficoideaceææ*, and afterwards made a separate order ; and another order has been made, called *Quillagæææ*, including only the genera *Kageneckia* and *Quillaja*.

ORDER LXIX.—CALYCANTHACEÆ.

THERE are only two genera in this order, both of which are remarkable for the fragrance of their flowers. The American Allspice (*Calycanthus floridus*) is a shrub, with very dark blackish purple flowers, which botanists consider to be all calyx, the plants in this order having no petals. The lobes of the calyx are somewhat leathery in texture, and lanceolate in form ; they are very numerous, and they are disposed in several rows, like scales. The stamens are numerous, but only the outer twelve are fertile, and they soon fall off. The peduncle is thickened below the flower ; and the receptacle is dilated, and drawn out over the carpels, which are arranged in it like those of the rose, which they closely resemble, but are much

larger. The leaves are opposite and feather-nerved. *Chimonanthus fragrans*, so well-known for its beautiful yellowish flowers, which are produced about Christmas, belongs to this order. In this plant the lobes of the calyx are oval, and not nearly so numerous as in *Calycanthus*; the outer lobes look like bracts. The stamens are less numerous, and not deciduous; and only five are fertile, which are united at the base. This plant was formerly called *Calycanthus præcox*.

ORDER LXX.—GRANATEÆ.

THIS order has only one genus and two species. The Pomegranate (*Punica Granatum*) has a tubular calyx, with a limb in five or seven divisions, and the same number of petals as there are segments to the calyx. The calyx and corolla are both of the same colour. When the petals fall, the tube of the calyx swells, and becomes a many-celled berry, the limb of the calyx remaining on, and forming a kind of crown to the fruit. The cells are divided into two parts, and they contain a great number of seeds which are plunged in a juicy pulp. The other species, *P. nana*, only differs in being a dwarf plant, and in the leaves being narrower. The Pomegranate was formerly included in Myrtaceæ.

ORDER LXXI.—MEMECYLEÆ.

TROPICAL trees and shrubs, with white or purplish flowers, and eatable fruit.

ORDER LXXII.—COMBRETACEÆ

THIS order is well-known from the two beautiful climbing stove-plants, *Combretum purpureum*, and *Quisqualis indica*. The flowers of the former are disposed in racemes, which have a peculiarly light and graceful appearance, from the great length of their stamens; and as they are of a brilliant scarlet, the name of *Purpureum* is very ill applied to the species. The flowers of *Quisqualis indica* have a very long slender tube to the calyx, and five velvet-like petals, which vary in colour from a yellowish white to red, changing in the course of one day.

ORDER LXXIII.—VOCHYSIÆ.

BRAZILIAN trees and shrubs, with yellow flowers, and stipulate, feather-nerved leaves.

ORDER LXXIV.—RHIZOPHOREÆ.

THE Mangroves (*Rhizophora*) are tropical trees, growing in the soft mud of rivers, particu-

larly in that of the Niger, so that, when the rivers are full, they appear to grow out of the water. The seeds have the singular property of germinating in the capsule, and sending down long roots while yet hanging on the tree, the branches of which thus appear, at a little distance, as if covered with long white strings. All the genera belonging to this order require a stove in England.

ORDER LXXV.—LOPHIREÆ.

THE only plant contained in this order is a beautiful shrub from Sierra Leone, with terminal corymbs of white flowers, and coriaceous leaves.

ORDER LXXVI.—ONAGRARIÆ.—(SEE CHAP. IV.
IN P. 75.)

THE tube of the calyx generally adheres to the ovary, and its limb is usually two or four lobed, the lobes frequently adhering together. The petals are either four, or equal in number to the lobes of the calyx; they are inserted in the mouth of the tube, and are twisted in the bud. The fruit is generally a capsule, or a berry, with two or four cells; and there are numerous seeds. The leaves vary consider-

ably, and are sometimes alternate, and sometimes opposite, but never compound. De Candolle divides this order into six sections: viz. 1. *Montiniæ*; 2. *Fuchsieæ*; 3. *Onagreæ*, containing the Evening Primrose (*Oenothera*), and the French Willow Herb (*Epilobium*); 4. *Jussieueæ*; 5. *Circææ*, including the Enchanter's Nightshade (*Circæa*), and *Lopezia*; and 6. *Hydrocaryes*, containing the Water-caltrops (*Trapa natans*). This last section is sometimes made a separate order.

ORDER LXXVII.—HALORAGEÆ, OR CERCODIANÆ.

Most of the plants in this order are British weeds; as for example, the Water Milfoil (*Myriophyllum*), Water Starwort (*Callitriche*), and Mare's-tail (*Hippuris*); but some are natives of North America, China, &c., and one genus has lately been discovered in Australia, which Dr. Lindley has named *Loudonia aurea*, and which is a large shrub, with corymbs of golden yellow flowers.

ORDER LXXVIII.—CERATOPHYLLÆ.

BRITISH weeds called Hornwort.

ORDER LXXIX.—LYTHRARIÆ, or SALICARIÆ.

THE principal plants in this order that are interesting to amateurs, are included in the genera *Lythrum*, *Cuphea*, *Heimia*, *Lawsonia*, and *Lagerstroemia*. The genus *Lythrum* contains all those showy British plants which are called the Willow Herbs. The flowers are purple, and the petals, which are four or six in number, are crumpled in the bud. The stamens are either the same number as the petals, or twice the number, and the capsule is two-celled. The calyx, as in all the plants included in this order, is tubular, with numerous lobes; and the petals soon fall off. *Cuphea* is a genus principally of annual plants, with six or seven dark purple petals, unequal in size, and curiously inserted in the calyx. *Heimia* is a genus of South American shrubs, with yellow flowers. *Lawsonia inermis* produces the Henna, which the ladies of the East use to dye the palms of their hands pink; and *Lagerstroemia* is a beautiful conservatory tree, with handsome flowers. This plant is sometimes called the pride of India.

ORDER LXXX.—TAMARISCINEÆ.—THE
TAMARISK TRIBE.

THERE are very few plants in this order, and the only ones common in British gardens are

the French Tamarisk (*Tamarix Gallica*), and the German Tamarisk (*Tamarix*, or *Myriacaria Germanica*); both of which are easily recognized by their light airy branches, (which when young are covered with closely imbricated leaves, though the leaves drop off as the wood ripens,) and their terminal erect spikes of whitish or pink flowers. The seeds are large, and are each furnished with a tuft of hairs at the end of a kind of stalk. These plants are very suitable for planting near the sea, as they are uninjured by the sea-breeze.

ORDER LXXXI.—MELASTOMACEÆ.

THIS order consists of showy exotic plants, most of which require a stove in Britain, and which are easily known by their leaves being marked with two or more deep lines running parallel to the midrib. They are all free-growing plants, with very handsome flowers, which are generally purple or white.

ORDER LXXXII.—ALANGIÆ.

THERE are two genera, *Alangium* and *Marlea*, both handsome shrubs, natives of India.

ORDER LXXXIII.—PHILADELPHEÆ.—THE MOCK-ORANGE TRIBE.

THERE are three genera in this order : viz., *Philadelphus*, the Mock Orange or *Syringa* ; *Decumaria* and *Deutzia*, all which have white flowers. There are many species of *Philadelphus*, all of which are easily known by their large white flowers, and large coarse-looking leaves. The flowers of the common species (*P. cornarius*) smell like those of the Orange, and the leaves taste like cucumber. There is only one species of *Decumaria* (*D. barbara*), which is a native of Virginia and Carolina, and is a climbing shrub, with terminal corymbs of white, sweet-scented flowers. *Deutzia scabra*, though only introduced in 1833, is already common in gardens ; and it is a general favourite from the great abundance of its flowers. Though it said to be not a true climber, its stems are too weak to stand without support. It is a native of Japan, and though generally kept in pots, it is supposed to be quite hardy.

ORDER LXXXIV.—MYRTACEÆ.—THE MYRTLE TRIBE.

No plants are more easily recognized than those belonging to this tribe ; as they are easily distinguished by their entire leaves, which have no stipules, and which, when held up to the

light, appear to be not only full of transparent dots, but to have a transparent line round the margin. The flowers have also abundance of stamens on long slender filaments which look like tufts of silk, and only four or five petals. The whole of the plants are fragrant, and every part of them seems full of an aromatic oil, which is particularly visible in the flower-buds of *Caryophyllus aromaticus*, which when dried form what are commonly called cloves; and in the leaves of some of the kinds of *Eucalyptus*. The genera may be divided into two sections, viz., those with a dry capsule for the fruit; in which are included *Melaleuca* and its allied genera, *Eucalyptus*, *Callistemon*, *Metrosideros* and *Leptospermum*; and those with berry-like fruit, the most interesting of which are *Psidium*, the Guava; *Myrtus*, the Myrtle; *Caryophyllus*, the Clove; *Eugenia* or *Myrtus pimenta*, Jamaica Allspice; and *Jambosa Vulgaris* or *Eugenia Jambosa*, the Rose Apple. In some of the genera, as for example in *Eucalyptus*, the sepals of the calyx become detached at the base, and being united above form a sort of cap or calyptra, which is pushed off by the stamens when the flower begins to expand. Besides the plants already enumerated, some botanists add another section to Myrtaceæ, which others consider a separate order, under the name of *Lecythideæ*.

This section contains three genera, the most remarkable plants in which are the Cannon Ball-tree (*Lecythis Ollaria*), and the Brazil Nut (*Bertholletia excelsa*). The fruit of this last plant is fleshy, and as large as a child's head, opening with a lid, and containing sixteen or twenty triangular seeds, laid over each other in a regular manner, which are the Brazil-nuts sold in the shops.

ORDER LXXXV.—CUCURBITACEÆ.—THE GOURD
TRIBE.

THE plants included in this order have generally the male and female flowers distinct. The calyx is tubular, and generally five-toothed; there are five petals usually connected at the base, and which have strongly marked reticulated veins. There are five stamens, four of which are united so as to form two pairs, with the fifth one free. The anthers are two-celled, and generally very long. There are three or five two-lobed stigmas, which are thick and velvety. The fruit is fleshy, with numerous flat seeds. The leaves are palmate, and very rough; and the plants have succulent stems, and climb by means of their tendrils. The principal genera are, *Cucumis*, which includes the Melon (*C. melo*), the Cucumber (*C. sativus*), the Mandrake

(*C. Dudaim*), the Water Melon (*C. citrullus*), and the Colocynth (*C. colocynthis*); Bryonia, best known by the White Bryony (*B. dioica*); Momordica, including the Balsam Apple (*M. balsamea*), and the Squirting Cucumber (*M. elaterium*); and Cucurbita, including all the kinds of Pumpkin (*C. pepo*), and Vegetable Marrow (*C. ovifera*). To these may be added Lagenaria, the Bottle Gourd; and Trichosanthes, the Snake Gourd, plants far more curious than useful. Some botanists include the Papaw-tree (*Carica Papaya*) in Cucurbitaceæ, but others make it into a separate order under the name of Payayaceæ.

ORDER LXXXVI.—PASSIFLOREÆ.—THE PASSION-
FLOWER TRIBE.

THE plants belonging to this order may be instantly recognized by the very singular arrangement of the pistil and stamens. The receptacle is raised in the centre of the flower so as to form a long cylindrical stipe, on which is placed the ovary, with its three styles, each ending in a fleshy stigma; a little lower are five stamens, with their filaments growing together round the stipe, and with large anthers which are attached by the back. At the base of the stipe are two or more rows of filaments without

anthers, which are called the rays. There are five petals and five sepals; but some botanists consider the whole to be sepals, and that the petals are wanting. The fruit of some of the species is eatable. It is about the size of a large egg, and contains numerous seeds, which are enveloped in a kind of pulp.

ORDER LXXXVI.*—MALESHERBIACEÆ.

THIS order consists entirely of the plants belonging to the genus *Malesherbia*; which are mostly annuals, or biennials, with very showy blue or white flowers, introduced from Chili in 1832. The genus was formerly included in *Passifloraceæ*.

ORDER LXXXVII.—LOASEÆ.

ALL the species contained in this genus are natives of North America, and most of them are annuals, with very showy flowers. The genera *Loasa* and *Caiophora* are covered with glandular hairs or bristles, which sting much worse than those of the nettle. *Bartonia aurea* is one of the most splendid annuals in cultivation, from its golden yellow flowers; *Blumenbachia* has the fruit roundish and spirally twisted, and *Caiophora* has the fruit horn-shaped, and

twisted in a similar manner. This curious construction of the fruit may be seen in *C. punicea*, the well known showy climber, generally called *Loasa aurantiaca*, or *lateritia*. The fruit of the true kinds of *Loasa* is plain and not twisted, as may be seen in *L. nitida*, *L. Placei*, and in short in all the other species of the genus. The flowers of most of the plants in this order are very curiously constructed, there being two sets of petals quite distinct in form and colour, and two sets of stamens. The five outer petals are large and hooded, and in each is cradled a bundle of four or more stamens. These petals and stamens are turned back; but there is a second set of five petals which are generally blotched with red, which stand erect, and enclose a second set of stamens also erect, which surround the style.

ORDER LXXXVIII.—TURNERIACEÆ.

THE only genus in British gardens is *Turnera*, and the species are hothouse and greenhouse herbaceous plants, with flowers very like those of the Bladder Ketmia. On examination, however, it will be immediately seen that they do not belong to the Mallow tribe, as their stamens are distinct, whereas those of all the *Malvaceæ* are united into a central column.

ORDER LXXXIX.—PORTULACEÆ.—THE PURSLANE
TRIBE.

THE ornamental plants belonging to this order, are all included in the genera *Calandrinia*, *Portulaca*, *Talinum*, and *Claytonia*; and those belonging to the first two of these genera have very showy flowers. In all the species the flowers have a distinct calyx, generally of only two sepals, which remains on till the seeds are ripe; and a corolla of five regular petals, which close in the absence of the sun. Each flower has numerous stamens, and a single style with a broad-lobed stigma which, is succeeded by a dry, one-celled capsule, with a central placenta, to which are attached numerous seeds. The capsule opens naturally when ripe by splitting into three or four valves. But the most distinctive mark by which plants belonging to this order can be distinguished from others with similarly shaped flowers, is their remarkably thick fleshy leaves, an example of which may be seen in the leaves of *Calandrinia discolor*; and these succulent leaves render all the ornamental plants belonging to the order peculiarly liable to be destroyed by frost or damp. Some botanists make a second order out of the plants usually included in Portulacæ, to which they give the name of Fouquieracæ.

ORDER XC.—PARONYCHIEÆ.

WEEDY plants, containing among other genera, Knot-grass (*Illecebrum*), and Strapwort (*Corrigiola*). The new order Scleranthaceæ has been separated from this; and it takes its name from the British weed, Knawel (*Scleranthus*).

ORDER XCI.—CRASSULACEÆ.—THE HOUSELEEK
TRIBE.

THE common Houseleek (*Sempervivum tectorum*) grows, as is well known, on the tiles of houses, or on walls, where there does not appear a single particle of earth to nourish its roots. The leaves are, however, so contrived as to form a cluster of flat scaly circles, and thus to shade and keep moist the roots beneath them. The flowers, which are produced on a tall flower-stem rising from the leaves, are pink, and usually consist of a green calyx, cut into twelve segments, and a corolla of twelve petals, with twelve stamens and twelve carpels, which spread out like a star in the middle of the flower. The number of petals, &c., is by no means constant, as it varies from six to twenty; but the other parts of the flower vary in the same manner, and always agree with each other,

except as regards the stamens, which are sometimes twice the number of the petals, and arranged in two series, those in one series being abortive. At the base of each carpel is a kind of scale or gland, and this is the case with most of the genera included in the order. There are several species of *Sempervivum*, natives of the Canary Isles, which are very ornamental, and which have yellow flowers; but this genus, and that of *Sedum*, the Stone-crop, have been lately remodelled by Mr. Philip Barker Webb, and some new genera formed out of them. The principal other genera in the order are *Crassula* and *Kalosanthus*; the latter having been formed out of the former, and including those species of *Crassula* which have a tube-shaped corolla, with a spreading limb, divided into five segments, while the flowers of those species which have been left in *Crassula* have five distinct petals. All the plants belonging to the order have succulent leaves; and in all of them the number of the petals, sepals, and carpels, is the same, and of stamens either the same, or twice as many. In the common Houseleek, the anthers sometimes produce seeds instead of pollen.

ORDER XCII.—FICOIDEÆ.—THE FIG-MARIGOLD
TRIBE.

THE principal genus in this order is that of *Mesembryanthemum*, the Fig-marigold. In the species of this genus, the leaves are always thick and fleshy, and sometimes in very singular shapes; and sometimes they are covered with a sort of blistery skin, which makes them look as though covered with ice, as in the Ice-plant (*M. crystallinum*). The leaves, when this is the case, are said to be papulose. Some of the species are annuals, others shrubby, and others perennials; and they are all natives of the Cape of Good Hope. The flowers, which are generally showy, have a green, fleshy, tubular calyx, with a four or five cleft limb, the tubular part of which encloses the ovary; and a corolla of numerous very narrow petals, which are arranged in two or more series. The stamens are very numerous; and the capsule has four or more cells, each of which contains numerous seeds. The valves of the capsule open when the seeds are ripe, if the weather should be dry; but remain firmly closed, so long as the weather continues wet.

The genera *Reaumuria* and *Nitraria*, which were formerly included in this order, have been removed from it, and made into separate orders,

the latter of which is introduced here ; and the genus *Grielum*, which was formerly included in *Rosaceæ* was first removed to *Ficoideæ*, and afterwards made into a separate order, under the name of *Neuradiaceæ*, which precedes *Nitrariaceæ*.

ORDER XCIII.—CACTACEÆ.—THE CACTUS TRIBE.

THERE is perhaps no order in the vegetable kingdom which embraces plants so singular in their forms as those comprehended in this tribe. All the genera, with the exception of *Pereskia*, are destitute of leaves, but they have all succulent stems which answer the purposes of leaves. The flowers of all the genera are extremely showy; the calyx and corolla are coloured alike, and confounded together; the stamens are numerous, with versatile anthers and very long filaments; the style is generally long and slender, and the stigmas are numerous, and either spreading or collected into a head. The ovary is in the tube of the calyx, and it becomes an eatable fruit, very similar to that of the gooseberry. The genera are all natives of tropical America. The principal kinds are the following: viz. *Mammillaria*, the stems of which are subcylindrical, and covered with tubercles,

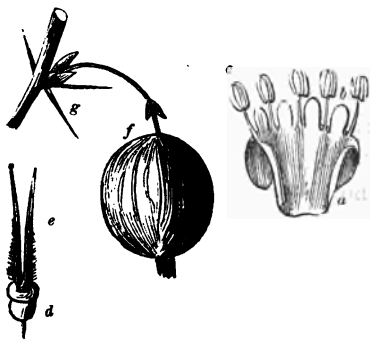
which are disposed in a spiral manner; and each of which is crowned with a little tuft of radiating spines mixed with down. The flowers are without stalks, and they are disposed in a kind of zone round the plant. The Melon Thistle or Turk's-cap (*Melocactus communis*) has a globose stem with deep furrows, the projecting ribs having tubercles bearing tufts of spines. The stem is crowned with a woolly head, from which the flowers are protruded, the flowers themselves resembling those of *Mammillaria*, but being larger. The Hedgehog Thistles (*Echinocactus*) have stems resembling those of the different species of *Melocactus*, but they have not the woolly head; and the flowers rise from the fascicles or tufts of spines on the projecting ribs. The Torch-Thistle (*Cereus*) has generally an angular stem with a woody axis, and it has tufts of spines on the projecting angles. It has not a woolly head, and the flowers, which are very large and showy, either arise from the tufts of spines, or from indentations in the angles. The limits of this genus are very uncertain; and several plants which are included in it by some botanists, are placed in other genera by others. The Old-man Cactus was once called *Cereus senilis*, but it is found to have a woolly head of great size, which has very much the appearance of

a sable muff, and as, consequently, it cannot belong to that genus, it has been called *Pilocereus*. This plant is covered with long white hairs, and, when of small size, it looks very much like an old man's head. In its native country, however, it grows to a great height, and specimens have been imported fifteen feet long, and not more than a foot in circumference. The Peruvian Torch-Thistles (*C. hexagonus* and *peruvianus*), in their native country, are upwards of forty feet high, though not thicker than a man's arm. They grow close together without a single branch, and form a singular sort of prickly crest on the summit of some of the mountains in South America. The creeping *Cereus* (*C. flagelliformis*) has slender cylindrical trailing stems, which hang down on every side when the plant is grown in a pot. The flowers, which are very numerous, are pink. The night-flowering *Cereus* (*C. grandiflorus*) only opens during the night, and fades before morning; the rays of the calyx are of a bright yellow when open, and the petals are snow-white. The stem is angular, branched, and climbing, throwing out roots at every joint. The common Torch-thistle (*C. speciosissimus*) is an erect plant, with a three or four angled stem, and very large bright crimson flowers, which are purplish inside; and *C. speciosa*, sometimes called *Epi-*

phyllophylanthoides, has thin leaf-like stems with beautiful pale rose-coloured flowers. *C. Jenkinsonii* is a hybrid between the last two species. *C. truncatus* is another well-known species. *Opuntia* has stems consisting of round, flat, leaf-like bodies, united together by joints, and generally covered with tufts of spines. The most remarkable species are *O. communis*, the Prickly Pear, grown to a great extent in the South of Europe, and also in Brazil, as hedges, the fruit of which is very good to eat; *O. Tuna*, the Indian Fig, common in South America, and much cultivated there, both as a hedge plant and for its fruit; and *O. cochinillifera*, the Nopal-tree, very much cultivated in Mexico and South America, for the cochineal insect, which feeds upon it. *Rhipsalis* has slender cylindrical jointed stems, which look like samphire. All these genera have only leaves when quite young, and as soon as the plants begin to grow, the leaves fall off. *Pereskia*, however, is a genus belonging to this order which has leaves like ordinary plants, which it retains during the whole period of its existence. The principal species are *P. aculeata*, the Barbadoes Gooseberry, and *P. Bleo*, which has beautiful rose-coloured flowers.

ORDER XCIV.—GROSSULARIÆÆ.—THE GOOSEBERRY TRIBE.

THIS order consists of only one genus (*Ribes*), which includes all the Gooseberries and Currants; the two kinds forming two distinct sections. The first section, which embraces all the Gooseberries, has prickly stems, and the flowers are produced singly, or in clusters of not more than two or three together. The flower of the common Gooseberry (*Ribes Grossularia*) consists principally of the calyx (*a* in *fig.* 136), the five segments of the limb of which are turned back,

FIG. 136.—THE GOOSEBERRY. (*Ribes Grossularia*).

and coloured of a reddish-brown. The petals (*b*) are white and erect, and bearded at the throat; but they are so small and inconspicuous, that

few people would notice them if they were not pointed out. The stamens (*c*) are five in number, and erect, and the anthers burst lengthways on the inside. The ovary (*d*) is below the cup of the calyx, and the style, which is cloven to the base (*e*), is always covered with hairs in the common Gooseberry (*R. Grossularia*), and is more or less hairy in the other species. There are two little bracteoles (*f*) on the pedicel; and a large bract, deeply cut, at the point from which the pedicel springs (*g*). The leaves, which are omitted in the engraving, also grow from the same bud, and are three or five lobed, and hairy; and there are three spines just below them. The fruit is a many-seeded berry, with the seeds immersed in pulp; and on cutting open an unripe fruit, it will be found that the seeds are each inclosed in an aril, with a separate footstalk, by which they are attached to a membrane lining the sides of the berry, and which is called a parietal placenta. The segments of the calyx remain on the ripe fruit. Several of the ornamental species of *Ribes* belong to this division, as, for example, *R. triflorum*, which has white flowers; and *R. speciosum*, which has crimson flowers, with the segments of the calyx not reflexed, and long projecting stamens like those of the Fuchsia. The fruit and the whole of the stems and branches of this

species are covered with spines, and thus the plant is easily distinguished from the common gooseberry, the stem of which has no spines, except three just below each bud.

The Currants are distinguished by the stems being entirely without spines, and the flowers being produced in racemes. The leaves are cordate, and bluntly three or five lobed, a little downy beneath, but smooth above. The flowers of the Red Currant (*Ribes rubrum*) are numerous, and they are produced in drooping racemes, with a little bracteole at the base of each foot-stalk (see *a* in *fig.* 137). The calyx is flattish, with the segments (*b*), which are of a pale greenish colour, spreading widely, and not recurved. The anthers (*c*) are loosely attached to the filaments, and they burst sideways and



FIG. 137.—THE RED CURRANT.

across. The style (*d*) is short, and divided into two spreading stigmas at the apex. The fruit is smooth and transparent, with many seeds, and it retains the remains of the calyx (*e*) when ripe. The white, and the striped or flesh-

coloured Currants, are varieties of *R. rubrum*. The Black Currant (*R. nigrum*) has a more compact, and campanulate flower (see *a* in *fig.* 138),



FIG. 138.—THE BLACK CURRANT.

with the segments of the calyx reflexed; the anthers (*b*) are more firmly attached to the filament; the style (*c*) is not cleft, and the stigma is two-lobed and capitate. The fruit (*d*) has a thick opaque skin, and the eye of the calyx is larger; the leaves are also covered on the under surface with glands or cells, filled with a fragrant oil formed by the limb, as shown at (*e*), which represents the appearance of the leaf when held up to the light. There is often a solitary flower on a separate pedicel, at the foot of the raceme; and there are frequently ten stamens instead of five, and no petals, the petals having been changed into stamens—a metamorphose the reverse of that which generally takes place.

The most ornamental kinds of Currant are *R. multiflorum*, with very long drooping racemes

of greenish flowers ; *R. sanguineum*, the flowers of which are crimson, and somewhat tubular ; *R. aureum*, which has the flowers of a golden yellow, and quite tubular ; and *R. cereum*, which has roundish leaves covered with white waxy dots on their upper surface, and racemes with few flowers, which are rather large, and of a pure white. A few species, such as *R. saxatile* and *R. Diacantha*, appear to be intermediate between the Currant and the Gooseberry, as they have the racemes of fruit common to the one, with the spines and habit of growth of the other. There is said to be another species nearly allied to *R. sanguineum*, with dark-purple flowers, which has not yet been introduced.

ORDER XCV.—ESCALLONIACEÆ.

OF the genera included in this order (which were formerly included in Saxifragaceæ), Escallonia is the most important, as it contains several species of ornamental South American shrubs. The flowers of the different species vary considerably : in *E. rubra*, they are produced singly, and the corolla, which is pink, is tubular, with a short, five-cleft limb ; but in *E. montevidensis* the flowers, which are white, are produced in panicles, and have spread petals. The flowers

of both species have five stamens, and two carpels, the styles of which are combined. The leaves are simple, alternate, and without stipules. Of the other plants contained in the order, I may mention that *Itea virginica* is a North American shrub, with white flowers; and *Anopteris glandulosa*, which is also a shrub with white flowers, is a native of Van Diemen's Land.

ORDER XCVI.—SAXIFRAGACEÆ.

THE genus *Saxifraga* of Linnæus has been divided so as to form several genera; but they do not appear to be generally adopted. The flowers of all the species are rather small, and they are generally racemose, or paniced; and the corolla consists of five spreading petals with short claws, and there are twice that number of stamens. Among the most common species may be mentioned London Pride (*Saxifraga* or *Robertsonia umbrosa*), and the Meadow Saxifrage (*Saxifraga* or *Leiogyne granulata*), the flowers of the latter being large, and produced singly. In the genus *Hydrangea* the flowers are disposed in corymbs, and they have five petals, ten stamens, and from two to five styles; but in the outer flowers of the corymb the stamens and pistil are often wanting.

The genera *Galax* and *Francoa*, which were first included in *Crassulacæ*, and afterwards in *Saxifragacæ*, are now made into a new order called *Galacineæ*, or *Francoacæ*, which is introduced here.

ORDER XCVII.—CUNONIACEÆ.

THIS order, which was separated from *Saxifragacæ* by Dr. Brown, contains principally hothouse plants with erect spicate racemes or panicles of small flowers. *Weinmannia*, *Bauera*, and *Cunonia* are the principal genera.

ORDER XCVIII.—UMBELLIFERÆ—UMBELLIFEROUS PLANTS OR THE PARSLEY TRIBE.

THIS is a very large order, but it is so natural that no person who has seen Parsley in flower can ever be in any doubt as to an umbelliferous plant. Most of the species are either culinary plants, such as the Parsnep and Carrot, Celery, Parsley, Fennel, &c., or poisonous weeds, such as Hemlock, and the Water Parsnep; and there are very few ornamental plants included in the order: among these few may, however, be mentioned *Didiscus* or *Trachymena cœrulea*, *Eryngium*, and *Bupleurum* or *Tenoria fruticosum*, *Angelica*, and *Heracleum*. Some of the species of the latter, particularly the Gigantic Siberian

Cow Parsnep (*H. asperum*), are perfectly magnificent objects. Notwithstanding the ease with which these plants may generally be recognised, as in some of the allied orders the flowers grow in umbels or cymes, it may be necessary to remark that Dr. Lindley defines umbelliferous plants to consist of those which have their "flowers growing in umbels, with inferior fruit, which, when ripe, separates, or may be separated, into two grains." Thus the common Dogwood is not an umbelliferous plant, though its flowers grow in umbels, because its fruit is a berry.

ORDER XCIX.—ARALIACEÆ.

THE most interesting plant in this order is *Hedera Helix*, the common Ivy; a well-known climbing evergreen shrub, which throws out roots from its branches at intervals, which it strikes into any substance to which it can adhere. The flowers have all their parts in five or ten divisions; even the lower leaves, which are smooth and leathery, are five-lobed. The leaves on the flowering branches, which are always in the upper part of the plant, are entire. The flowers are produced in umbels, and they are succeeded by berries, which, in correspondence with the parts of the flowers, are five or ten celled. The large-leaved variety, called

the Irish Ivy, is a native of the Canary Isles ; and the gold and silver leaved, and golden berried, are all varieties of the common kind. There are, however, many exotic species, most of which have not yet been introduced. The genus *Aralia*, known by its two garden species, *A. spinosa* and *A. japonica*, belongs to this order. The first of these is called the Angelica Tree, and is an old inhabitant of our gardens ; but *A. japonica* is of quite recent introduction.

ORDER XCIX.*—HAMAMELIDEÆ.

THE most interesting plants in this order are the Witch Hazel (*Hamamelis virginica*), and *Fothergilla alnifolia*. In the first of these plants, there are four long narrow petals, and the calyx is four-lobed ; and there are eight stamens, of which four are fertile, and four barren. There are two styles, and the capsules are leathery and two-celled, and two-valved, with one seed inclosed in an aril in each cell. The Witch Hazel has the peculiarity of coming into flower when it drops its leaves in autumn, remaining in flower all winter, and forming its fruit in spring, just as it is opening its new leaves. The flowers are yellow, and very pretty from their great abundance, and the light feathery effect produced by the great length and narrowness

of the petals. The leaves are rough and feather-nerved, like those of the Hazel. Fothergilla is a pretty little shrub with terminal spikes of white flowers with yellow anthers, which are sweet-scented and appear before the leaves.

ORDER C.—CAPRIFOLIACEÆ, OR THE HONEY-SUCKLE TRIBE.

THIS order, as originally constituted, may be divided into three tribes, viz., *Corneæ*, containing *Cornus*, *Benthamia*, and, according to some, *Aucuba*; *Sambuceæ*, containing *Sambucus* and *Viburnum*; and *Lonicereæ*, containing *Symphoria*, *Caprifolium*, *Lonicera*, *Leycesteria*, *Linnæa*, &c. *Cornus*, *Benthamia*, and some other genera, among which Dr. Lindley places *Aucuba*, are now formed into a separate order, under the name of *Cornaceæ*. The different species of Dogwood (*Cornus*) are known by the smooth bark of their stems and branches, which is frequently red, or reddish brown; by their white flowers, which are produced either in heads, or umbels, or in corymbose panicles; by their red or blackish berries; and by their coarse feather-nerved leaves. The principal species of *Cornus* are the wild or female Cornel (*C. sanguinea*); the common Dogwood (*C. alba*); the male Cornel, or Cornelian Cherry (*C. mas*); and American

Dogwood (*C. florida*). All these plants have a very small four-toothed calyx, and a corolla of four petals. There are four stamens and one style. The fruit is a berry-like drupe. Some of the species, as for example *C. florida*, have a large involucre of four leaves, having the appearance of petals. *Benthamia fragifera*, called by Dr. Wallich *C. capitata*, has an involucre of four leaves of yellow, tinged with red, surrounding a head of small greenish inconspicuous flowers. The fruit consists of a number of drupes, grown together like a Mulberry, with six, eight, or more seeds, surrounded with a viscid pulp. The leaves are long and tapering, of a fine texture, and of a light green above, and silvery white below.

The genus *Sambucus*, the Elder, is characterised by its pinnate leaves and terminal cymes of flowers, which have a small five-lobed calyx, a rotate corolla also five-lobed, five stamens about the length of the corolla, no style, and three obtuse stigmas. The berries are globular, pulpy, and one-celled; each containing three or five seeds, which are convex on the outside, and angular within. The berries differ in colour in the different species, those of the common kind being a deep purplish black, and those of *S. racemosa* being red. The stems and branches are of a soft wood, having a white

spongy pith. The white-berried Elder is a variety of the common kind.

The genus *Viburnum* contains several well-known plants, among which may be mentioned the Laurestinus (*V. Tinus*), the Guelder Rose (*V. Opulus*), and the Wayfaring Tree (*V. Lantana*). This genus is very nearly allied to *Sambucus* in the flowers, but it is easily distinguished, on examination, by its leaves, which are not pinnate, and by its wood, which is hard and not spongy. The berries have also only one seed, and they are not eatable,—those of the Laurestinus are, indeed, injurious. The Laurestinus and some other species are evergreen; but by far the greater number of species are deciduous.

The genus *Lonicera* formerly included all the kinds of Honeysuckle; but now only the upright species, or what are called the Fly Honeysuckles, are comprised in it, and the climbing kinds are called *Caprifolium*. One of the upright kinds, most common in gardens, is the Tartarian Honeysuckle (*L. tartarica*), the flowers of which are in twins. The corolla is tubular and funnel-shaped, with a five-cleft limb. There are five stamens, a filiform style, and a capitate stigma. The berries are distinct when young, but they afterwards grow together at the base. The leaves are always

distinct. The genus *Caprifolium* embraces all the climbing species, the flowers of which are disposed in whorls, and the upper leaves are connate, that is, growing together at the base, so that two appear only one leaf, with the stem passing through it. A single leaf of this kind is called perfoliate. The flowers spring from the axils of the leaves, and are what are called ringent, that is, they are composed of five petals, four of which grow together, almost to the tip, while the fifth is only attached to the others about half its length, and has the loose part hanging down. Flowers of this kind, with their lower part forming a tube, and their upper part widely open, are said to be gaping. In the Trumpet Honeysuckle (*C. sempervirens*) the tube of the corolla is very long, and the lobes of the limb nearly equal; and the flowers, instead of springing from the axils of the leaves, form terminal spikes, each consisting of three or more whorls of flowers.

The Snowberry (*Symphoria racemosa*) bears considerable resemblance to the upright Honeysuckles. The flowers are funnel-shaped, and four or five lobed. The berry has four cells, but two of the cells are empty, and the others have only one seed in each. The leaves are oval, quite entire, and not connate.

Leycesteria is a very handsome shrub, with

white flowers, and very large and showy purple and reddish bracts. The berries are of a very dark purple, and they are nearly as large as a gooseberry. *L. formosa* is a native of Nepaul, but it appears tolerably hardy in British gardens, and it stands the sea-breeze without injury.

Linnaea borealis is a little insignificant trailing plant, which is included in this order, and which is only worth mentioning on account of its being named in honour of Linnæus. It is a half-shrubby evergreen, with small bell-shaped flesh-coloured flowers, which are said to be fragrant at night.

ORDER CI.—LORANTHÆ.

Four genera are included in this order, all remarkable in different ways. The first of these is the common Mistletoe (*Viscum album*), a most remarkable parasite, a native of Britain, and generally found on old apple-trees; and the second is *Loranthus europæus*, a native of Germany, closely resembling the Mistletoe, but found generally on the oak, where the true Mistletoe rarely grows. This plant is said to have been introduced in 1824, but it is not now in the country. There are other species of the genera, one a native of New Holland. *Nuytsia*

floribunda, also a native of New Holland, a very curious plant, is also included in this order. It is a shrub about three feet high, so covered with orange-coloured blossoms that the colonists call it the Fire-tree. When the seed of this plant germinates, it is said to have three cotyledons. The last plant generally included in this order is *Aucuba japonica*, though it is probable this plant belongs to Cornaceæ. Of this species we have probably only a variety, from the variegation of the leaves; and it has never produced seeds, as only the female plant has been introduced.

ORDER CII.—CHLORANTHÆ.

INCONSPICUOUS plants with greenish flowers, which require a hothouse in Britain.

ORDER CIII.—RUBIACEÆ. (SEE CHAP. V. P. 85.)

THIS order is divided into thirteen sections, most of which have been already described. In all the species the tube of the calyx adheres to the ovary, which is crowned with a fleshy cup, from which arises the single style; and the petals are united at the base, and attached to the upper part of the tube of the calyx.

ORDER CIV.—OPERCULARIÆ.

Exotic weeds, formerly included in Rubiaceæ.

ORDER CV.—VALERIANEÆ.—THE VALERIAN
TRIBE.

No person can ever have been in the neighbourhood of Greenhithe, in Kent, without having observed the red Valerian, which grows in such abundance on the steep banks of the chalk-pits in that neighbourhood; and probably still more of my readers will be familiar with the common wild Valerian, or All-heal, which is found in moist places, generally among sedges, in every part of England. Another species of the same genus is common in Scotland, so that the name of Valerian is familiar to all persons who know anything of British plants. Common as these plants are, however, probably most of my readers are unaware of the very curious construction of their flowers; or of the very great variety exhibited by the different species. The genus *Valeriana* is, indeed, one which presents a remarkable instance of variety of construction, united with a similarity of form which makes all the species recognisable at a single glance. In all the species, the corolla is funnel-shaped, with a

long tube, and a five-lobed limb. In the red Valerian (*V. rubra*), the lower part of the tube is drawn out into a spur; and on this account the plant is sometimes called the spurred Valerian, and it has been placed by De Candolle in a new genus, which he called *Centranthus*. The other species of Valerian have the tube of the flower gibbous, that is, much larger on one side than on the other. In all the calyx is tubular, with the limb curiously rolled, so as to form a rim or crown to the fruit, like that on the heads of basket-women. When the flowers drop, the fruit, which is one-celled and one-seeded, and which adheres closely to the tube of the calyx, begins to swell, and as it does so the limb of the calyx gradually unrolls, till at last, when the fruit is ripe, it forms a sort of feathery tuft to waft it away. The leaves of plants of this genus vary exceedingly, even on the same plant; but generally those of the red Valerian are lanceolate; those of *V. dioica* are pinnatifid; those of the wild Valerian (*V. officinalis*), pinnate; and those of the garden Valerian, the kind found in Scotland, (*V. pyrenaica*), are cordate. The flowers of *V. dioica* are male and female, and are found on different plants. The principal other genera in this order are Valerianella, the Corn Salad or Lamb's Lettuce; and Fedia, the Horn of Plenty.

ORDER CVI.—DIPSACEÆ.—THE TEASEL TRIBE.

THE principal genera belonging to this order are *Dipsacus*, the Teasel, and *Scabiosa*, the Scabious; to which may be added a pretty little annual called *Knautia*. The plants belonging to this order bear considerable resemblance to those included in *Compositæ*, as they consist of a head of florets seated on a common receptacle, which is chaffy, and surrounded by an involucre. The florets are also furnished with what may be called a double calyx, the limb of the inner part being cut into long teeth, and resembling the pappus of the *Compositæ*. In the genus *Dipsacus*, the most important plant is the Fuller's Teasel (*Dipsacus fullonum*), in which the receptacle is raised in the form of a cone, and the chaffy scales are hooked, and so strong, that the flower-heads when dry are used for preparing broad-cloth. The leaves of this plant are opposite, and united at the base. The florets have a four-cleft corolla, and four distinct stamens; differing in this respect decidedly from the *Compositæ*, which have five stamens, the anthers of which are always united into a tube. *Dipsacus sylvestris* might be easily mistaken for a kind of Thistle; but the difference will be seen at once by examining the anthers of the florets. The Devil's-bit Scabious,

which is so called from the root looking as though a part had been bitten off, has the same kind of flower-head as the *Dipsacus*, but the receptacle is flat, and the involucre much smaller. In some of the species of *Scabious*, the florets of the outer ring resemble those of the ray in flowers of the *Compositæ*. The leaves of the genus *Scabious* are as variable as those of the genus *Valeriana*, scarcely two species being alike.

ORDER CVII.—CALYCERÆÆ.

OBSCURE American plants, nearly allied to *Compositæ*.

ORDER CVIII.—COMPOSITÆ. (SEE CHAP. VI. P. 98.)

PLANTS with heads of florets on a common receptacle, surrounded by an involucre. The florets are of three kinds, viz., ligulate, tubular, and bilabiate; the heads consisting sometimes entirely of florets of one kind, and sometimes with ligulate florets forming the outer ring, called the ray, and tubular flowers forming the centre, called the disk. The calyx continues on the ripe fruit, and its limb is frequently cut into a kind of fringe called the pappus. The fruit is of the kind called an achenium, that is, dry and bony, and continuing enveloped in the persistent calyx, but without adhering to it.

ORDER CIX.—LOBELIACEÆ.

THE genus *Lobelia* is well known from the pretty little blue-and-white flowering plants that are so common in pots for windows and balconies, and that continue flowering so freely all the summer. There are two or three species which are grown for this purpose, viz. *Lobelia Erinus*, *L. bicolor*, and *L. gracilis*, all annuals, which require to be raised on a hotbed by sowing in February, and which will then flower all the summer, with no other care than regular watering. All these flowers have the tube of the calyx united to the ovary, with a five-parted limb. The corolla is irregular and tubular, with the tube cleft on the upper side, and thickened at the base. The limb of the corolla is divided into two parts; one of which, called the upper lip, is cut into two narrow sharp-pointed segments, which stand erect; while the lower lip, which is much the longer, and hangs down, is cut into three rounded segments. There are five stamens, the anthers of which grow together, and at least two of them are bearded. The capsule is oval, two-celled, two-valved, and many-seeded, opening naturally at the top when ripe. These general characters will be found in all the numerous species of *Lobelia*, as the genus at present stands, as they

all have the two hornlike segments of the upper lip, and the rounded lobes in the pendulous under lip; and many of the plants formerly called *Lobelia* which differ in these particulars have been placed in other genera. Thus *Tupa*, which contains several of the large scarlet-flowered species, has the segments of the limb of the corolla united at the tip; the filaments of the stamens cohering as well as the anthers, and the stigma protruding. *Siphocampylos* has the tube of the corolla ventricose in the middle, the segments of the upper lip long and curving over each other, and the lower lip very slightly lobed, with both the filaments and the anthers combined. In *Dortmannia* the filaments are free, and only the anthers combined; in *Parastronthus* (*L. unidentata*), there is scarcely any tube to the corolla, and in *Isotoma*, the corolla is salver-shaped. The beautiful little *Clintonia pulchella* belongs to this order, and it differs from *Lobelia* in its corolla having scarcely any tube, and also, but more decidedly, in the very long tube of its calyx. This is so long and slender as to look like a part of the flower-stalk; as does the capsule, which, when ripe, is triangular, and is as long as the silique of a cabbage or wall-flower, to which it bears considerable resemblance. All the *Lobeliaceæ* have an acrid milky juice, which is poisonous.

ORDER CX.—STYLIDÆ.

THIS order contains three genera of New Holland plants, only one of which has been introduced. The flowers are tubular, with a five-cleft limb, and they are covered with hairs, terminating in capitate glands; the stamens are united into a column, which is bent towards the fifth or lower segment of the limb, which is much larger than the others. The united stamens are so irritable as to start forward when touched with a pin.

ORDER CXI.—GOODENOVIÆ.

ALL the plants in this order are natives of New Holland, and they bear considerable resemblance to those included in Lobeliaceæ, but they have not a milky juice, and the stigma, which is very small, and without any style, is surrounded by a curious cup called an indusium, which is generally found full of pollen. This very remarkable organ is probably rendered necessary by the very small size of the stigma, which can only absorb the pollen very slowly. The most interesting genera contained in this order are *Lechenaultia* and *Euthales*.

ORDER CXII.—CAMPANULACEÆ.—THE
CAMPANULA TRIBE.

THE plants in this order have a bell-shaped regular corolla, consisting of five petals, usually grown together so as to form a monopetalous corolla with five lobes, each lobe having a conspicuous central nerve or vein. There are five or more stamens, which are generally distinct, and which have broad bearded filaments bending over the ovary. The style is at first short, but it gradually elongates itself, and both it and the stigmas are furnished with tufts of stiff hairs, which, as the style pushes itself through the stamens, brush off the pollen, and retain it till the stigma is in a proper state to receive it. The anthers burst as soon as the corolla opens. The capsules have generally two, three, or five cells, and each cell contains many seeds.

In the genus *Campanula*, the capsule opens by little valves, which look as though cut with scissors. The juice of the plants is milky, but not poisonous. The principal genera are *Campanula*, *Prismatocarpus* (Venus's Looking-glass), *Roellia*, *Phyteuma* (the petals of which are distinct), *Trachelium*, *Wahlenbergia*, and *Adenophora*. *Lobeliaceæ* and *Goodenoviaceæ* were formerly included in this order.

ORDER CXIII.—GESNERIÆ.

THE corolla is tubular and sub-bilabiate, with a five-cleft limb. There are four stamens, two longer than the others, with the rudiments of a fifth. The anthers generally adhere in pairs; the fruit is one-celled and many-seeded; the leaves are thick and covered with a soft down; and the roots are frequently tuberous. The qualities are excellent. The species of the genus *Gesneria* are usually hothouse plants, with bright scarlet flowers; and those of *Gloxinia* have generally purple flowers; and of *Sinningia* the flowers are greenish.

ORDER CXIV.—VACCINIÆ. (SEE CHAP. VII. P. 130.)

THIS order includes the Whortle-berries, Bilberries, and Cranberries, and it is very nearly allied to *Ericaceæ*, from which it is distinguished by the disk, which lines the calyx, entirely surrounding the ovary, which is thus placed below the rest of the flower, and is called inferior. The fruit is a berry.

ORDER CXV.—ERICACEÆ. (SEE CHAP. VII. P. 109.)

ALL the Heath tribe, including the *Arbutus*, *Rhododendron*, *Azaleas*, &c., are distinguished

by their anthers, which have a little hole or pore at the apex of each cell; each cell being also generally furnished with a kind of spur at its base. The stamens in all these genera grow from beneath the ovary, and the filaments are thick and fleshy. The fruit is a dry capsule, or follicle.

ORDER CXVI.—PENEACEÆ.

BEAUTIFUL shrubs, natives of the Cape of Good Hope, with the habit of *Pimelea*, and corymbs of pale pink flowers. The calyx is in two sepals, the stigma four lobed, and the fruit four-valved, with two seeds in each cell.

§ III.—COROLLIFLOREÆ.

The plants comprised in this division are called monopetalous, as they have their petals joined together, so as to form a cup for the stamens and pistils quite distinct from the calyx; and the stamens are attached to the corolla.

ORDER CXVII.—EPACRIDEÆ.

THIS order stands on debateable ground, being by many botanists included in the last division; but it seems properly placed in this,

as the stamens are attached to the petals, which adhere together; and if a flower of any species of *Epacris* be examined, it will be found that the corolla, with the stamens attached to the lining of the tube, parts readily from the calyx without losing its natural form. The flowers are tubular or campanulate, with a five-cleft limb, and will divide readily into five petals, each of which has the filament of a stamen attached to it, leaving only the anthers free. The anthers are one-celled and awnless, and this is the principal distinction between this order and *Ericaceæ*. The calyx is five-cleft, coloured like the corolla; and there are five scale-like bracts below it, which look like a calyx. The capsule is dry, with the seeds attached to a central column. The leaves are dry, hard, and prickly. The species are natives of Australia, where they supply the place which the Heaths hold in Europe and Africa; no Heath having been yet found in any part of Australia.

ORDER CXVIII.—SYMPLOCINEÆ.

THIS order contains one genus, *Symplocos*, of greenhouse and stove shrubs, from South America, with small white flowers, and serrated leaves, which turn yellow in drying.

ORDER CXIX.—STYRACINÆÆ.

THE plants in this order best known in English gardens are *Styrax officinale*, the Storax, and *Halesia tetraptera*, the Snowdrop-tree. The flowers of both are white; those of Storax are funnel-shaped, with a five-cleft limb; there are ten stamens, growing together at the base, with short filaments, and very long anthers. The fruit is a drupe which is nearly dry, containing a one-celled nut, enclosing from one to three seeds. The seeds have two skins, the inner one like a cobweb, and the outer one spongy. The bark, when wounded, affords the gum called storax. *Halesia* has drooping bell-shaped white flowers, something like those of the

Snowdrop, (see *a* in *fig.* 139,) with four petals and twelve or sixteen stamens combined into a tube at the base. The fruit is a dry, winged drupe, which has four angles in *H. tetraptera* (*b*), and two in *H. diptera*; and which contains a stone or putamen (*c*), which

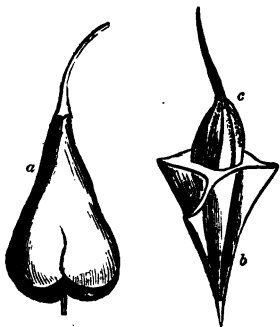


FIG. 139.—SNOWDROP TREE (*Halesia tetraptera*).

has two or four cells, and as many seeds. Some botanists make Halesiaceæ a separate order.

ORDER CXX.—MYRSINÆ.

SHOWY shrubs, with evergreen leaves, and cymes of white or red flowers, which require a stove or greenhouse in England. The plants belonging to this order may be easily known on cutting open their flowers, as they are the only monopetalous flowers among the stove plants that have the stamens opposite the lobes of the corolla; the general position of the stamens being between the lobes. The principal genera in this order are *Myrsine*, the species of which are greenhouse shrubs; and *Ardisia*, the latter being well-known stove shrubs, with white flowers and red berries. *Theophrasta*, *Clavija*, and *Jacquinia*, were included in this order; but they are now formed into a new one, under the name of *Theophrastæ*.

ORDER CXXI.—SAPOTÆ.

THIS order is best known by the genera *Argania*, *Sideroxylon*, *Chrysophyllum*, and *Bumelia*, all of which are stove or greenhouse plants. The seeds of *Achras Sapota* contain abundance of

oil, which is so concrete as to have the appearance of butter ; and hence the tree is called the Butter-tree. *Sideroxylon* has such hard wood as to be called the Iron-tree. The juice of all these plants is milky, and the milk is wholesome as food.

ORDER CXXII.—EBENACEÆ.

THE principal genus is *Diospyros* ; which contains the Ebony-tree (*D. Ebenum*), the Date-plum or Lotus-tree (*D. Lotos*), both natives of the East Indies ; and the Persimon (*D. virginiana*), a native of North America. The species are trees with hard dark wood ; that of Ebony is quite black when old, and remarkably heavy. The flowers are white and inconspicuous, and the fruit, which is eatable, but insipid, is a berry, placed in the centre of the calyx, which spreads round it like a saucer. It is very harsh when first gathered, and must be kept till it is half decayed, like the Medlar, before it is eaten.

ORDER CXXIII.—BREXIEÆ.

LARGE stove trees, with axillary branches of white flowers.

ORDER CXXIV.—OLEINÆ.—(SEE CHAP. VIII. P. 136.)

THIS order comprises the common Ash, the Manna Ash, the Olive, the Privet, the Fringetree, the Phillyrea, and the Lilac. The flowers of all have only two stamens, and a roundish two-celled ovary, without any disk. The flowers of the Ash have no corolla, and the fruit is a samara. In the other genera, the flowers are more or less funnel-shaped, and the fruit is a capsule. The leaves are generally pinnate, and always opposite. The seeds have a dense albumen.

ORDER CXXV.—JASMINEÆ.—(SEE CHAP. VIII., P. 134.)

THIS order has been separated from the last, chiefly on account of the seeds having no albumen. The principal genus is the Jasmine, which has a funnel-shaped corolla, and pinnate leaves. Some botanists insert, between Oleaceæ and Jasmineæ, the new order Columelliæ, which contains only one plant, *Bolivaria trifida*.

ORDER CXXVI.—STRYCHNEÆ.

TROPICAL trees. The principal genus *Strychnos*, the fruit of which is the well-known poisonous nut, *Nux vomica*. The genera *Theophrasta* and

Fagræa were formerly included in this order; but the first is now placed in the new order, Theophrastææ (see p. 399); and the second is placed in another new order introduced here, and called Potaliacææ.

ORDER CXXVII.—APOCYNEÆ.

VERY showy plants from various parts of the world, some of which require a stove in Britain, while others are quite hardy. They also vary in some of them being trees, others erect shrubs or climbers, and others perennial; but they are all easily recognised by the twisted direction of the segments of the corolla, which has been compared to the rays of St. Catharine's-wheel. The corolla is generally salver-shaped as in the periwinkle (*Vinca major*), or funnel-shaped, as in *Taberna montana*, and *Allamanda cathartica*, or divided into equal segments as in *Nerium Oleander*. The flowers are often bearded in the throat, and furnished with hypogynous scales; with the stamens inclosed in the flower, and the anthers lying close together. The seed is contained in two follicles, which are slender, and have their seeds disposed in two rows. The species all abound in an injurious milky juice; and two of the genera, *Cerbera* and *Tanghina*, are virulent poisons.

ORDER CXXVIII.—ASCLEPIADEÆ.

THESE plants are very nearly allied to the last, and they differ chiefly in having the segments of their corollas straight, in their stamens being united into a sort of crown, and in their pollen being found in masses of a waxy substance. The seeds are also each furnished with a tuft of fine long silky hair. The principal plants are *Periploca græca*, a hardy, climbing, shrub, with rich, dark, velvet-looking flowers, which are said to be poisonous to flies, and *Hoya carnosa*, a stove or greenhouse climber, with waxen-looking, clustered, odoriferous flowers, distilling honey; to these may be added *Pergularia*, a stove climber, remarkable for its fragrance, *Physianthus*, *Gonolobus*, *Ceropegia*, and *Asclepias*, all singular-looking climbing plants; and besides these, I may mention *Stapelia*, the species of which are dwarf plants, with their flowers hanging down below the pots in which they grow, and the odour of which is so like that of carrion, as to induce flesh-flies to lay their eggs upon them.

ORDER CXXIX.—GENTIANEÆ.—THE GENTIAN-TRIBE.

THE best known genera are *Gentiana*, (the Gentian), *Lisianthus*, and *Menyanthes* (the

Buckbean). The flowers have a tubular calyx and corolla, the latter plaited in the tube, and with an equally-parted limb, which is generally five cleft; and an equal number of stamens with broad filaments, and arrow-shaped anthers. The seeds are numerous, and are usually in two follicles.

The orders Spigeliaceæ, Loganiaceæ, and Menyanthaceæ, have been separated from Gentianeæ, and are adopted by some botanists.

ORDER CXXX.—BIGNONIACEÆ.

THE most interesting genera are—*Bignonia*; from which *Tecoma* has been divided by some botanists, on account of a slight difference in the seed-pod; *Jacaranda*, said to produce the rosewood of commerce; *Eccremocarpus*, and *Catalpa*. All the plants included in this order have winged seeds, and generally very long horn-like seed-pods. The different species of *Bignonia* or *Tecoma* have trumpet-shaped flowers with a five-toothed calyx, and four stamens of unequal length, with the rudiments of a fifth. The capsule is very long and narrow, resembling a silique in shape, but broad on the outside, and the leaves are pinnate. *Eccremocarpus*, or *Calampelis scabra*, is a well-known climber, with orange-coloured, bag-like flowers, which are produced in secund racemes; large, roundish warted

fruit, with winged seeds; and pinnate leaves, with tendrils. In *Catalpa* the corolla has a very short tube, and an unequal, five-lobed limb. There are five stamens (only two of which are fertile); and an exceeding long, cylindrical, silique-shaped seed-pod, which is sometimes two feet or more in length. The leaves of the *Catalpa* are heart-shaped. In *Jacaranda*, the capsule is above two feet long, and quite flat. *Crescentia cujète*, the calabash-tree, belongs to this order.

ORDER CXXXI.—COBÆACEÆ.

THIS order is restricted to one genus *Cobæa*, of which one species (*C. scandens*) is common in British gardens. This plant is an annual climber, with showy bell-shaped flowers, which are first green, and afterwards become purple. This plant has remarkably long tendrils, which twist themselves round any thing that comes in their way.

ORDERS CXXXII. AND CXXXIII.—PEDALINEÆ AND SESAMEÆ.

THESE orders are now united into one, under the name of Pedalineæ; and the most interesting genus is *Martynia*, consisting of half hardy annual plants with bell-shaped flowers, and very curious seed-pods.

ORDER CXXXIV.—POLEMONIACEÆ.

THIS is a very interesting order to the lovers of ornamental flowers, from the beauty of those of some of the genera. The genus *Polemonium*, the Greek Valerian, has one species (*P. cœruleum*) which is found wild in many parts of England, and is known by the names of Charity and Jacob's Ladder. The corolla, which is of a deep blue, softening into white in the centre, is rotate, with the stamens, which are bearded at the base, inserted in the throat. The capsule is three-celled, and many-seeded, as is generally the case with plants in this order, and the leaves are pinnate. The Phloxes are well-known; all the species are very handsome, but none are more so than the beautiful annual (*P. Drummondii*). The corolla of these plants is salver-shaped, with an elongated tube, the limb twisted in the bud, and wedge-shaped segments. The stamens are inserted above the middle of the tube, and the cells of the capsule are one-seeded. *Leptosiphon* has the corolla funnel-shaped, with a very long slender tube, and a campanulate limb with oval lobes; the corolla is covered with a great number of fine glandular hairs, and the limb is twisted in the bud. The stamens, which have very short filaments, are inserted in the throat of the corolla. The calyx

consists of five sharply-pointed hairy lobes, connected by a very fine membrane. The flowers are surrounded by a great number of sharply-pointed bracts. Similar bracts are very conspicuous in the genus *Collomia*. *Gilia* and *Ipomopsis*, so well known for their splendid flowers, also belong to this order.

ORDER CXXXV.—HYDROLEACEÆ.

ELEGANT little plants, distinguished from the preceding order by the flowers having two styles, and a two-valved capsule. *Retziaceæ*, an order containing only one Cape plant, is inserted here by some botanists, who have separated it from *Convolvulaceæ*.

ORDER CXXXVI.—CONVOLVULACEÆ.

THE principal genera are *Convolvulus*, *Ipomœa* and their allies. The genus *Convolvulus* formerly included all the beautiful monopetalous flowers with a folded limb, which are so common in gardens, but it is now restricted to those which have a two-celled capsule, with the cells two-seeded; the stamens are inclosed in the corolla, and the stigma is divided into two narrow thread-like lobes. *Ipomœa* only differs in having the lobes of the stigma capitate. In *Quamoclit*,

the little scarlet *Ipomœa*, the capsule is four-celled, and the cells one-seeded; the corolla is tubular, and the stamens project beyond the throat. *Batatas*, the Sweet-potato, resembles *Quamoclit*, but the corolla is campanulate, and the stamens are inclosed. In *Pharbitis* (in which genus the common *Convolvulus major*, and the beautiful *Ipomœa Learii*, are both now included), the capsule is three-celled, and the cells are three-seeded; and in *Calystigia*, in which is now placed the common bindweed of the hedges, the capsule is one-celled and four-seeded; and the flower, which in other respects agrees with that of the genus *Convolvulus*, has two bracts which serve as a sort of involucre. All these flowers have the lobes of the corolla marked with a decided fold or plait, and they are climbing plants, generally annuals. *Cuscuta* is a parasite belonging to *Convolvulaceæ*, which though it springs from the ground, withers just above the root as soon as it has twined itself round any plant within its reach; drawing its entire nourishment from the unfortunate plant it has attacked, and which it soon kills. The plants in this order produce an acrid milk; and the roots of a kind of *Convolvulus* yield the drug called *Jalap*, which takes that name from the Mexican city *Xalapa*, near which it is grown.

ORDER CXXXVII.—BORAGINÆÆ.

THE fruit of the plants included in this order consists of four distinct carpels, each containing a bony nut. These nuts frequently appear as though a hole had been bored in them at the base, and they are frequently striped or twisted. The flowers are generally secund, or rather they are produced in spikes which appear to have flowers only on one side, from the spikes being curiously rolled up before the flowers expand, and uncoiling gradually as they open. The corolla is generally salver or funnel shaped, with a five-lobed limb, and five little scales just within the throat, which appear to be placed there to close up the orifice. There are five anthers, which seem attached to the corolla, without any stamens, and a slender style terminating in a two-lobed stigma. The calyx is tubular, and remains on the fruit till ripe; the teeth of the calyx contracting at the point, so as to cover the ripe carpels. The principal genera are *Pulmonaria* (Lungwort), *Symphytum* (Comfrey), *Cerinthe* (Honeywort), *Lithospermum* (Gromwell), *Echium* (Viper's Bugloss), *Anchusa* (Bugloss); *Myosotis* (Scorpion-grass or Mouse-ear), one species of which, *M. palustris*, is the Forget-me-not; *Omphalodes* (Venus' Navelwort), *Cynoglossum* (Hound's-tongue), and *Heliotropium* (the Heliotrope).

ORDER CXXXVIII.—CORDIACEÆ.

EAST INDIA trees and shrubs of which *Ehretia* is, perhaps, the best known. Nearly allied to *Boragineæ*.

ORDER CXXXIX.—HYDROPHYLLEÆ.

THIS order is interesting from its containing *Phacelia*, *Eutoca*, and *Nemophila*, all well known Californian annuals.

ORDER CXL.—SOLANACEÆ (SEE CHAP. IX. P. 141).

THE genera *Verbascum* and *Celsia* have been removed from this order, and formed by some botanists into another called *Verbascinæ*, though by Dr. Lindley they are included in *Scrophularinæ*. The plants left in the order *Solanaceæ* have all a tubular calyx, which remains on the fruit till it is ripe; and the fruit itself is generally round and fleshy, with two or four cells and numerous seeds. In some of the genera, the permanent calyx looks like a capsule, but on opening it, the little berry-like fruit will be found inside. There are five stamens, the anthers of which are two-celled like those of most other plants, and the filaments are inserted in the corolla, which is generally partly tubular

with a spreading limb, the segments of which are plaited, that is, each bears the crease of a fold in the middle, as may be seen in the *Petunia*. In the order *Verbascinæ*, the corolla is rotate, and the segments are not plaited; the anthers also are only one-celled. Most of the plants belonging to *Solanaceæ* are poisonous in a raw state; but they lose their deleterious qualities when cooked.

ORDER CXLI.—SCROPHULARINÆ.

THE Foxglove is generally taken as the type of this order, and it has a tubular corolla (see *a* in fig. 140) with a short limb (*b*), and a spreading calyx (*c*). There are four stamens of unequal length inserted on the base of the corolla

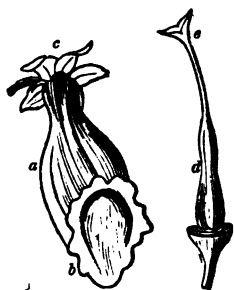


FIG. 140.—FOXGLOVE
(*Digitalis*).

and hidden in its tube; and an oblong ovary (*d*), with a long style, and a two-lobed stigma (*e*). The fruit is a dry capsule with two cells, and numerous seeds. The flowers of the other genera are very irregular. In the *Snapdragon*, the corolla is what is called *personate*; and in

the *Calceolaria* the lower lip is curiously inflated'.

The stamens also differ. In most of the genera there are four, but in *Pentstemon* there is a fifth, long and slender, and hairy at the point, but without any anther; and in *Calceolaria* and *Veronica* there are only two. Among the genera included in this order may be mentioned *Buddlea*, the flowers of which grow in ball-like heads; *Paulownia*, *Maurandya*, *Mimulus*, *Alonsoa*, and *Collinsia*. The Toadflax (*Linaria*), and several other British plants belong to it; but the Yellow Rattle (*Rhinanthus*), and some other allied plants, have been formed into a new order called *Rhinanthaceæ*; *Chelone* and *Pentstemon* have been formed into an order called *Cheloneaceæ*; and *Sibthorpia*, *Disandra*, &c., into one called *Sibthorpiaceæ*. *Trevirana* or *Achimenes*, and *Columnnea*, are removed to *Gesneriaceæ*.

The new order *Cyrtandraceæ*, including *Æschynanthus*, *Streptocarpus* or *Didymocarpus*, *Fieldia*, and *Amphicoma*, is introduced here: the first and last of these genera are new, and the others were formerly included in *Bignoniaceæ*.

ORDER CXLII.—LABIATÆ.

THE plants belonging to this order include Mint, Sage, Thyme, and other kitchen aromatic plants, and several well-known British weeds.

They are all distinguished by a tubular, bilabiate corolla with a projecting under lip (see *a* in fig. 141). In some plants the corolla is ringent, as shown in fig. 142, taken from Dr. Lindley's *Ladies' Botany*, in which *a* is the galea or



FIG. 141.—A LABIATE FLOWER.



FIG 142.—BLACK HOREHOUND (*Ballota nigra*).

helmet, and *b* the lower lip, which is three-lobed. There are four stamens, two of which are longer than the others, and the cells of the anthers differ from those of most other plants in spreading widely apart from each other, each being joined to the filament only at the tip. The pistil consists of four distinct carpels (*c*), a very long style lobed at the tip, and furnished with a very small stigma at the tip of each lobe (*d*). The flowers of some of the plants belonging to this order are disposed in a whorl round

the stem; as, for example, those of the Dead Nettle (*Lamium*). Among the other plants belonging to the order may be mentioned the Bugle (*Ajuga*), and the Ground Ivy (*Glechoma*), both common but very pretty British weeds.

ORDER CXLIII.—VERBENACEÆ.—THE VERVAIN
TRIBE.

THE genus *Verbena* is well known, from the many beautiful species now common in every greenhouse. The fruit is two or four celled, and a drupe or a berry, and the calyx of the flowers is tubular, and persistent round it; but the corolla is deciduous, and falls off long before the fruit is ripe. In the genus *Verbena* the calyx is tubular, with five distinct angles, ending in five teeth. The corolla has a cylindrical tube nearly double the length of the calyx, and a flat limb divided into five unequal segments, which are wedge-shaped and notched, the central one of the lower three appearing to have been slightly pinched; the throat of the corolla is hairy. There are four stamens, two longer than the others, the anthers having two widely-spreading lobes, as in the Labiatæ. The style is slender below, and thickest in the upper part; and the stigma is two-lobed. The leaves are opposite, and furnished with stipules

The flowers form a corymb in the Scarlet Verbena, and a spike in some of the other kinds, which elongates gradually as the flowers expand. The principal other genera are Clerodendron, or Volkameria; Vitex (the Chastetree), Lantana, Aloysia (the Lemon-scented Verbena), and Tectona (the Teak) which is so much used in the East Indies for ship-building.

ORDER CXLIV.—MYOPORINÆ.

AUSTRALIAN and Polynesian plants, nearly allied to Verbenaceæ. The principal genera are Myoporum and Avicennia, the White Mangrove of Brazil.

ORDER CXLV.—ACANTHACEÆ.

THESE plants are known by the elastic opening of the capsules, which are two-celled, and the hooked points of the seeds by which they are attached to the placenta. The calyx remains on the ripe fruit, but in most of the plants it is so extremely small as to be inconspicuous, and its place is supplied by three large leafy bracts. The corolla varies considerably, being sometimes two-lipped as in Justicia, sometimes funnel-shaped as in Ruellia,

and sometimes campanulate, with a spreading five-cleft limb, as in *Thunbergia*. There are only two stamens in *Justicia* and some of the other genera, but in *Thunbergia*, *Acanthus*, and *Ruellia*, there are four of unequal length, inclosed within the throat of the corolla. The ovary is imbedded in the disk, and it is two or many seeded; the style is simple, and the stigma one or two lobed.

ORDER CXLVI.—OROBANCHEÆ.

LEAFLESS parasites, with brown or colourless scaly stems and flowers. The genera are *Lathræa* and *Orobanche*.

ORDER CXLVII.—LENTIBULARIÆ.

PRETTY little marsh plants, natives of Europe and North America. *Pinguicula* has very much the appearance of a violet, and the *Utricularias* are floating plants.

ORDER CXLVIII.—PRIMULACEÆ, THE
PRIMROSE TRIBE.

THE plants belonging to this order are easily known by the stamens, or rather anthers, for

they have scarcely any filaments, being affixed to the corolla in the centre of the lobes, instead of being alternate to them, and by the capsule, though five or ten ribbed, being only one-celled, with a central placenta, to which the seeds are attached. The calyx remains on the ripe fruit. In the genus *Primula* (the Primrose), the calyx is tubular, and strongly marked with five distinct angles, which end in as many teeth; and the corolla is salver-shaped, with a contraction in the tube, at the insertion of the stamens, the five segments of the limb being wedge-shaped and notched. The style is slender, and the stigma capitate. The capsule opens naturally by ten teeth, which curl back. The *Cyclamen*, or Sow-bread, one of the genera belonging to this order, has the lobes of the corolla bent back; and when the flower falls, the peduncle coils up in a most curious manner, so as to bury the seed-vessel in the earth. These plants have tuberous roots, which are so acrid as only to be eaten by the wild-boars. The seed-vessel of the Pimpernel (*Anagallis*) resembles a round case with a lid, which may be taken off, when it displays a great number of seeds, so closely packed, that no room is lost. The principal other genera are the

American Cowslip (*Dodecatheon*), Bear's-ear Sanicle (*Cortusa*), *Soldanella*, the Water Violet (*Hootonia*), and Loosestrife (*Lysimachia*).

ORDER CXLIX.—GLOBULARIÆ.

PRETTY alpine plants, with blue flowers. †

ORDER CL.—PLUMBAGINEÆ.

THIS order probably belongs to Monochlamydeæ. The principal genera are Sea Lavender (*Statice*), remarkable for the coloured foot-stalks of the flowers; Thrift (*Armeria*); and Leadwort (*Plumbago*). The corolla in these plants is either monopetalous, with the stamens free from the corolla and growing from beneath the pistil, or with five petals, to which the stamens are attached. There are five styles and five stigmas, but only a one-celled and one-seeded ovary. The fruit is thin and dry. The pedicels of all the species of the Sea Lavender, particularly of *Statice arborea*, are often mistaken for the flowers.

CHAPTER II.

PHANEROGAMOUS PLANTS—DICOTYLEDONEÆ.—

II. MONACHLAMYDEÆ.

IN all the plants contained in this division, the stamens and pistils have either no floral covering, or only one; and as, when this is the case, the covering is called the calyx, the plants in this division are said to have no corolla. Some botanists think that the calyx and corolla have become intermixed, so as to form only one covering, which they call the perianth; a word applied to the calyx and corolla together.

ORDER CLI.—PLANTAGINEÆ.

THE weed called Plantain, or Rib-grass, is well known to all persons who keep birds, as it is a food that cage-birds are very fond of. It is conspicuous by its strongly-ribbed leaves, which form a flat tuft on the ground, and by the large arrow-shaped anthers of its four stamens, which hang on very slender filaments. The flowers are arranged in dense spikes, and are green and inconspicuous.

ORDER CLII.—NYCTAGINEÆ.

THE Marvel of Peru (*Mirabilis Jalapa*), and the other species of that genus, are the only ornamental plants belonging to this order. The flowers consist of a coloured calyx, surrounded by a five-toothed involucre, which greatly resembles a calyx. The true calyx is funnel-shaped, with a spreading limb, the lobes of which are plaited, and notched at the margin; and which, with the tubular part, form at the base a globular swelling, which incloses the ovary. The stamens grow from beneath the pistil, adhering together at the base, so as to form a kind of cup. The ovary contains only one seed; and the style is long and slender, terminating in a capitate stigma, divided into a number of tubercles or warts. The lower part of the calyx remains on the ripe fruit, hardening into a kind of shell.

ORDER CLIII.—AMARANTHACEÆ.

THE flowers of the plants belonging to this order are either in spikes, like Love-lies-bleeding (*Amarantus caudatus*), in heads like the Globe Amaranth (*Gomphrena globosa*), or in a singular crest-like shape, like the Cock's-comb (*Celosia cristata*). In all, the flowers have no corolla,

and only a very thin and dry calyx, which is surrounded by hard, thin, dry bracts, of the same colour, each ending in a long point. There are generally five anthers, and two or three styles, with pointed stigmas; but the capsule contains only one cell and one seed; and when ripe, it divides horizontally in the middle, like the capsule of the Pimpernel.

ORDER CLIV.—PHYTOLACEÆ.

HERBACEOUS plants and shrubs, with racemes of red, white, or greenish flowers. *Phytolacca* is the principal genus; and one species, the Virginian Poke (*Phytolacca decandra*) is remarkable for being found wild in climates so different as Spain and Portugal, the north of Africa, Jamaica, and North America. The flowers are greenish, tinged with red, and they are followed by very dark purple berries, which are said to have been formerly used for colouring port wine, but the juice having medicinal qualities, their use in Portugal is now prohibited. *Rivina* belongs to this order.

ORDER CLV.—CHENOPODEÆ.

THE plants belonging to this order bear considerable resemblance to those included in the

order Amaranthaceæ, but their flowers are disposed in loose clusters without bracts, and all their parts are fleshy; while the flowers of the Amaranthaceæ are disposed in dense spikes with bracts, which, as well as the divisions of the flowers, are quite hard and dry. The stamens are five in number, and they are spread out like those of the Nettle tribe; there are two styles with hairy stigmas, and the capsule resembles the Echinus, or Sea Urchin. The principal genera in this order are,—Spinach (*Spinacea*), Red and White Beet (*Beta vulgaris*), Mangold Wurtzel (*B. altissima*), Chard Beet (*B. cicla*), the Strawberry Blite (*Blitum*), Fat-hen or Goosefoot (*Chenopodium*); Glasswort, the ashes of which are used in making glass (*Salicornia*), Saltwort (*Salsola Kali*, or *Soda*), from the ashes of which soda is prepared; and the Garden Orache (*Atriplex hortensis*). The leaves of all the species are somewhat succulent and pulpy, and they are frequently stained with brilliant colours.

ORDER CLVI.—BEGONIACEÆ.

THE only genus in this tribe is *Begonia*, the plants belonging to which have pretty flowers, and strongly-veined leaves, which are crimson on the lower side, with one half smaller

than the other, and each furnished with a pair of large stipules. The flowers are male and female; the first consist of four sepals, two of which are much longer than the others, and a beard of anthers, with the filaments united into one common stalk, and each anther containing two cells for pollen. The female flowers have five sepals; the lower part is thick and fleshy, having three unequal wings. This part becomes the capsule, and it is furnished with three stigmas, each of which has two curiously-twisted lobes. The capsule when ripe has three wings, one much longer than the others; and it is in three cells, each containing a central placenta with a double row of seeds, which are covered with a beautifully reticulated skin.

ORDER CLVII.—POLYGONEÆ.—THE BUCKWHEAT.

THIS order comprehends the Rhubarb (*Rheum*), the Dock (*Rumex obtusifolius*), Sorrel (*R. acetosa*), the Buckwheat (*Polygonum Fagopyrum*), Persicaria (*P. orientale*), Water-pepper (*P. hydropiper*), and Knot-grass (*P. aviculare*). The leaves of these plants either sheath the stem with the base of their petioles, or are furnished with ochreæ, that is, with stipules which are joined together so as to form a kind of purse or boot. The flowers are inconspicuous,

and the fruit is a triangular nut, retaining the calyx till it is ripe. The genera *Eriogonum*, *Calligonum*, and *Koenigia*, formerly included in this order, are now formed into another, called *Eriogonææ*.

ORDER CLVIII.—LAURINEÆ.—THE SWEET-BAY
TRIBE.

THESE plants are known by their anthers, which are two or four celled, with the valves curling upwards when ripe, like those of the Berberry, and the filaments are furnished near the base with two kidney-shaped glands. The male and female flowers are distinct; the former have six, eight, or twelve stamens, and a calyx of four or six divisions united at the base. The female flowers have a one-celled and one-seeded ovary, with a simple style, and an obtuse-crested stigma; and four or more abortive stamens, furnished with glands, but without anthers. The most interesting plants contained in this order are,—the Sweet Bay (*Laurus nobilis*), the Sassafras-tree (*L. Sassafras*, or *Sassafras officinale*), the Cinnamon-tree (*L. Cinnamomum*, or *Cinnamomum verum*, or *zeylanicum*); the Camphor-tree (*L. camphora*, or *Camphora officinarum*); and the Alligator Pear (*L. Persea*, or *Persea gratissima*). All the plants belonging to this order are aromatic, either in the leaves, bark, or fruit.

Two small orders, Illigereæ and Hemandia-cæ, containing Indian plants rarely met with in England, are introduced here by some botanists.

ORDER CLIX.—MYRISTICÆ.

THE only interesting plant in this order is the Nutmeg (*M. officinale*, or *moschata*). In this plant, the fruit is pear-shaped, and it consists of a half-fleshy pericardium enclosing a jet-black stone, encircled by a fleshy orange-red arillus, which is the mace. The nutmeg is the kernel of the stone, and it is not taken out for sale till it is sufficiently ripe to rattle when shaken. The leaves are of a dark green above, and glaucous beneath; and the flowers are white, with the red pistil conspicuous in the centre. The tree is a native of Ceylon and the East Indian Islands, and it requires a stove in England.

ORDER CLX.—PROTEACEÆ.

THE principal genera are Protea, Banksia, Dryandra, and Grevillea, all very singular plants, the species of which, when one of each genus has been seen, are easily recognised. They are all natives of the Cape of Good Hope and New Holland.

ORDER CLXI.—THYMELÆÆ.

THIS order is well known from the Mezereon and the Spurge Laurel, both common garden shrubs belonging to the genus *Daphne*. The berries of both are poisonous, and the bark acrid. The flowers of the Mezereon (*D. Meze-reum*) have a coloured calyx, which is tubular, with a four-cleft limb (see *fig.* 143), which is slightly hairy on the outer surface, and pitted



FIG. 143.—A FLOWER
OF MEZEREON.

on the inner one. It is said that this calyx will separate readily into two, the inner part peeling off like a lining: but I have never been able to effect this without tearing the outer covering. There are eight anthers, with scarcely any filaments, affixed in two rows to the throat of the corolla; and an egg-shaped ovary, with a tufted stigma without any style. The fruit is a drupe, that is, formed like a plum, with a fleshy pericardium, enclosing a stone or nut, the kernel of which is the seed, and which sometimes appears to be partially enveloped in a sort of hairy bag, which is the lining of the ovary become loose. The flowers of the Mezereon grow round the stem, with a tuft of leaves at the top; but those of the Spurge Laurel (*D. Laureola*) are in a cluster of

short drooping racemes. The most remarkable species of the genus is, however, the Lace Bark-tree of Jamaica (*D. Lagetto*, or *Lagetta linetaria*), the liber or inner bark of which has such tough fibres as to bear stretching out considerably without breaking; and in this state it resembles lace so much, that a collar and ruffles were made of it and sent to Charles II. Gnidia, a greenhouse plant, has little scales in the mouth of the calyx; and Pimelea has the flowers in heads, surrounded by a four-leaved involucre. The principal other genera are Lachnæa, a little Australian plant with woolly flowers, Passerina or Sparrow-wort, and Struthiola. The curious little tree called Leatherwood (*Dirca palustris*) also belongs to this order.

ORDER CLXII.—OSYRIDEÆ.

Exotic trees with white or greenish flowers. The only genera are the Poet's Cassia (*Osyris*), and a genus of Australian plants called Exocarpos.

ORDER CLXIII.—SANTALACEÆ.

THE most interesting plant is the Sandal-wood tree (*Santalum album*), which requires a stove in England; but the North American trees belonging to the genus *Nyssa*, including the Tupelo-

tree and the Ogechee Lime, are quite hardy. The flowers are small and insignificant ; and the fruit is a drupe.

ORDER CLXIV.—ELÆAGNEÆ.

THE three genera included in this order are the Sea Buckthorn (*Hippophae*), the Oleaster (*Elæagnus*), and the Shepherdia ; all so easily recognised by their silvery foliage, as to need no particular description. The flowers are small and inconspicuous.

ORDER CLXV.—ASARINEÆ, OR ARISTOLOCHIEÆ.

THE genus *Aristolochia*, or Birthwort, is remarkable for the very singular shape of its flowers, which are as strange, and as much varied, as it is possible for the wildest imagination to conceive. The flowers are tubular, with one lip much longer than the other ; and the tube takes an abrupt bend near the middle. Here are six anthers, fixed very curiously on the outside of a club-shaped column, split into six lobes at the point. In the centre of this column is a style with a six-rayed stigma ; and the fruit is a large capsule with six cells, which opens by as many slits, and discharges the numerous thin, flat, dark brown seeds.

Asarum canadense, the Wild Ginger of North

America, has kidney-shaped leaves, and dark purplish brown flowers, on very short footstalks, which resemble those of the genus *Stapelia*, both in appearance and smell.

ORDER CLXVI.—CYTINEÆ.

THE most interesting plant in this order is *Nepenthes distillatoria*, the Chinese Pitcher-plant, the leaves of which have a tendril at the point curiously dilated at the extremity, so as to form a cup-like appendage, which is generally full of water. The rim of the pitcher is beautifully ribbed, and it is furnished with a lid. The male and female flowers are on different plants, but neither of them possess much beauty. The remarkable Javanese fungus *Rafflesia* belongs to this order.

A small order called *Cephalotæ*, and containing only the genus *Cephalotis*, formerly included in *Rosaceæ*, is introduced here.

ORDER CLXVII.—EUPHORBIACEÆ.

THE genus *Euphorbia* is well known by the British weed called Caper Spurge, and the showy stove plants which belong to it. The male and female flowers are distinct; but both are inclosed in one cup-like involucre. In *fig. 144, a* is the

involucre, *b* the female flower, and *c* the male ones. The fruit (*fig. 145*) consists of three



FIG. 144.—EUPHORBIA.



FIG. 145.—FRUIT OF
EUPHORBIA.

carpels, each containing a single seed, which divide with elasticity when the seeds are ripe. All the plants belonging to this order have a milky, glutinous juice when young, which in some genera becomes solid when exposed to the air. This is particularly the case with *Siphonia Hevea*, a Brazilian tree, the sap of which yields the Indian rubber used for Macintosh cloaks, &c.; it being more suitable for that purpose than the caoutchouc yielded by the *Ficus elastica*, which is the true Indian Rubber. The principal other genera belonging to this order are the Box (*Buxus*), the tree kind of which yields the wood used for wood-engraving, and the dwarf variety is employed as edging for gardens; *Croton*, an annual species of which (*Croton Tiglium*) yields the celebrated Croton oil; the Cassava (*Jatropha Manihot*), which though poisonous in a raw state, becomes the wholesome food called tapioca, when properly

prepared ; Palma Christi (*Ricinus communis*), from the seeds of which castor-oil is made ; and the Manchineel tree (*Hippomane*), which is said to be so poisonous as to occasion the death of those who sleep beneath its shade.

ORDER CLXVIII.—STACKHOUSEÆ.

SMALL Australian shrubs with insignificant flowers.

ORDER CLXIX.—ANTIDESMEÆ.

EAST-INDIAN trees with inconspicuous flowers.

ORDER CLXX.—URTICEÆ.—(SEE CHAP. X. P. 157.)

THE plants belonging to this order are divided into two sections, viz. those with tough fibres, as the Hemp, the Nettle, &c. ; and those with milky sap, such as the Fig, the Mulberry, the Bread-fruit, &c. All the genera have the male and female flowers separate. The male flowers have four stamens which spring back and discharge their pollen with elasticity, and the female flowers have a one-celled ovary with two long stigmas.

ORDER CLXXI.—ULMACEÆ.

THE principal genera are the Elm (*Ulmus*), the Nettle-tree (*Celtis*), and the Zelkova-tree (*Planera*). The flowers, though very small, are pretty, from their opening in clusters before the leaves; and each has four stamens, with dark purple anthers, and is furnished with dark brown bracts. The fruit is a utricle, having a single seed, encircled by a broad thin transparent membrane. The leaves are rough, and their sides are unequal at the base. The bark of Elm trees is rough and deeply furrowed; and the roots spread, instead of penetrating deeply into the ground like those of the Oak.

ORDER CLXXII.—PIPERACEÆ.

THE species are generally climbing plants with perfect flowers, which are produced in spikes, and are succeeded by one-seeded berries. The genus *Piper* contains the common Pepper (*P. nigrum*), the Betel (*P. Betel*), and several other species.

ORDER CLXXIII.—JUGLANDACEÆ.—(SEE CHAP. XI.
P. 176.)

THE male and female flowers are distinct, but on the same plant. The male flowers are pro-

duced on long thick anthers, and each consists of a scale-like calyx enclosing numerous stamens ; the female flowers are two or more together, and each consists of a scale-like calyx, enclosing a one-celled ovary. The fruit is a drupe, that is, it consists of a fleshy husk enclosing a nut. The embryo fills the whole seed ; and the cotyledons are fleshy, two-lobed, and wrinkled. There are only two genera, the Walnut (*Juglans*), the male catkins of which are produced singly, and the Hickory (*Carya*), the male catkins of which are in clusters.

ORDER CLXXIV.—AMENTACEÆ.—(SEE CHAP. XI.
P. 174).

THE male flowers are in catkins, and the fruit of most of the genera is, when ripe, partially or wholly enclosed in a cup-like involucre, formed by the adhesion of the numerous bracts.

ORDER CLXXV.—HAMAMELIDEÆ.

THIS order has been already inserted, p. 380.

ORDER CLXXVI.—EMPETREÆ.

LITTLE heath-like plants, with small flowers and showy berries. The Crowberry, *Empetrum nigrum*, is very common in Scotland on heaths.

ORDER CLXXVII.—CONIFERÆ. (SEE CHAP. XII. P. 205.)

THE male and female flowers are both produced in catkins, and both consist only of scales. The pollen of the male flowers is very abundant, and is discharged freely in fine weather. The female flowers form cones, consisting of numerous scales, at the base of each of which are two winged seeds. The timber abounds in resin.

ORDER CLXXVIII.—CYCADEÆ. (SEE CHAP. XII. P. 229.)

THESE singular plants have thick timber-like trunks, yet they can hardly be called trees, as they increase in height by a single terminal bud. The leaves are pinnate, and they unroll, when they expand, like those of the ferns. The male flowers are in cones, and the female ones either in cones, or produced on the margin of contracted leaves. The principal genera are *Zamia* and *Cycas*, and one species of the latter yields a kind of sago; the true kind being a product of a species of Palm.

CHAPTER III.

PHANEROGAMOUS PLANTS.—MONOCOTYLEDONEÆ.

ALL the trees belonging to this division are natives of tropical countries ; and they, as well as all the herbaceous plants belonging to it, are distinguished by the veins of their leaves being never branched, but principally in parallel lines. These plants are re-divided into those with a perianth, which are called the Petaloideæ, and in which are included the Orchidaceæ and the bulbous-rooted plants ; and those without a perianth, which are called Glumaceæ, and in which are included the grasses, and sedges.

§ I.—PETALOIDEÆ.ORDER CLXXIX.—HYDROCHARIDEÆ.—THE FROG'S
BIT TRIBE.

AQUATIC plants, two of which are of very curious construction. In *Vallisneria*, the male and female flowers are on different plants, and the buds of the female flowers rise on long spiral stalks, which gradually uncoil, till the flower appears above the surface of the water,

where it expands. The male flowers are produced on separate plants at the bottom, but, before they expand, they detach themselves from the soil, and rise up to the surface, where they float till the flowers have opened, and the pollen has fallen on the stigmas of the female flowers, after which the male flowers wither, and the female ones coil up their stalks again to ripen the seed-vessels at the bottom. This curious arrangement is necessary, because the pollen should be dry when it falls on the stigmas; and nearly a similar arrangement takes place with the Fresh-water Soldier (*Stratiotes*). The Frog's Bit (*Hydrocharis morsus ranæ*) is a floating plant, with pretty white flowers. *Damosonium indicum* is a very handsome water-plant, with white flowers and winged stems.

ORDER CLXXX.—ALISMACEÆ.—THE WATER
PLANTAIN TRIBE.

THE principal genera in this order are *Alisma*, *Sagittaria*, and *Actinocarpus*, all common British aquatic plants. The Water Plantain (*Alisma plantago*) has ribbed leaves, and a loose panicle of small pinkish flowers, which have a permanent calyx of three sepals, a corolla of three petals, six stamens, and numerous carpels, which grow close together so as to form a

head, as in the *Ranunculus* tribe. *A. natans*, which is generally found on lakes in the mountainous districts of Wales and Cumberland, has rather large white flowers, with a yellow spot at the base of each petal. The flower-stalks rise high above the water, and the flowers expand in the months of July and August. The common Arrowhead (*Sagittaria sagittifolia*) has curiously-shaped leaves, resembling the head of an arrow. The flowers are white, and resemble those of *A. natans*; but they have a pink spot at the base, and there are numerous stamens. The flowers are in whorls, and those in the upper whorls are generally destitute of carpels. The common Star-fruit (*Actinocarpus damsonium*) has only six carpels, which are so arranged as to form a star-like fruit when ripe.

ORDER CLXXXI.—BUTOMEÆ.—THE FLOWERING
RUSH TRIBE.

THE flowering Rush (*Butomus umbellatus*) is certainly the handsomest of the British aquatic plants. The flowers are rose-coloured, crimson, or white; and they are produced in large erect umbels. The calyx and the corolla are generally of the same colour, and in three divisions each; there are nine stamens and six capsules, which are many-seeded. The leaves are trian-

gular or flat. *Limnocharis Plumieri* is a very handsome Brazilian aquatic belonging to this order.

ORDER CLXXXII.—JUNCAGINÆ.—THE ARROW-GRASS TRIBE.

INSIGNIFICANT bog plants, with grassy leaves, and central spikes or racemes of greenish yellow flowers.

ORDER CLXXXIII.—ORCHIDACEÆ.

THE plants belonging to this order may be divided into two kinds, those that grow in the earth, and those which require to have their roots suspended in the air; the latter being the beautiful tropical plants called Orchideous Epiphytes. Most of the terrestrial Orchidaceæ are British plants belonging to several genera, the most curious of which are *Orchis*, *Habenaria*, *Ophrys*, *Aceras*, *Noctia*, *Epipactis*, and *Malaxis*. Nearly all the British Orchidaceæ have tuberous roots, which remain above ground, a new tuber being formed every year. The leaves are alternate, with an entire margin, without any footstalk, and sheathing the stem at the base. The flowers are produced in a spike, furnished with bracts, and though they are very irregular in their forms, there are cer-

tain particulars in which they all agree. Though in reality sessile, they appear to have each a footstalk, but this footstalk is only the long twisted ovary (*c* in *fig.* 146), which is one-



FIG. 146.—ORCHIS MORIO.

celled and many-seeded, and which serves to support the calyx and corolla of the flower, which are both above it. The calyx consists of three sepals, one of which has the appearance of a hood (*a*), and the others (*b b*) look like wings. The petals are very disproportionate in their size; two are generally very small, and are only seen peeping beneath the hood of the calyx; while the third (*d*), which is called the labellum, or lip, is very large, and hangs down. In the centre of the flower is a singular mass, called the column, composed of the stamens and pistil, grown together (see *a* in *fig.* 147). In this column there is one perfect

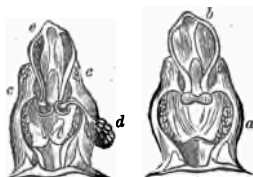


FIG. 147.—POLLEN MASSES OF THE ORCHIS.

anther (*b*), and two imperfect ones (*c c*). The perfect anther consists of a pouch or bag, which, when opened, displays two stalked masses of globular pollen, one of which (*d*) is pulled

down to show its appearance, while the other remains in its case at (e). The stigma is a sort of cup half full of a glutinous fluid, but it appears entirely shut out from the pollen, which is not only enclosed in its pouch or bag, but is of such a solid waxy nature as to prevent any possibility of its being carried by wind or insects to the stigma. Nature, however, has contrived a means of obviating the difficulty. At the foot of each stalk of the pollen masses, there is a little protuberance, covering a gland, through which the pollen descends to the stigma, and thence to the ovary or germen.

The different genera are distinguished, partly by the manner in which the granules of the pollen adhere together, and partly by the shape of the flowers; and their different species vary principally in the form of the labellum. In the genera *Orchis* and *Habenaria*, the labellum is drawn out behind into a kind of spur (see *e* in *fig.* 146); and in others it assumes strange shapes, as in the Man Orchis (*Aceras anthropophora*), where the labellum looks like a little man; and in the Lizard Orchis (*A.* or *Orchis hircina*) where the labellum is drawn out into a long tail, which looks like the tail and long body of the lizard, while the petals, which are long and narrow and bent back, look like the hind legs. In the genus *Ophrys*, the labellum

also takes strange shapes, sometimes resembling a bee, at others a fly, and at others a spider. In the genus *Cypripedium*, the two side stamens bear anthers and pollen, and only the central one is imperfect.

In the orchideous epiphytes the same general construction prevails, but the forms of the flowers are still more varied and fantastic. All of them have pseudo bulbs above ground, which serve as substitutes for the tubers of the terrestrial species.

ORDER CLXXXIV.—SCITAMINEÆ.

THIS order contains several plants, well known for their useful properties, as for example, the Ginger (*Zingiber officinale*), and the Turmeric (*Curcuma Zerumbet*). Some of the plants grow tall and reed-like, as for example in *Hedychium*. Most of the genera have a creeping underground stem, called a rhizoma, which is often jointed. The flowers are produced in spathe like bracts; the calyx is tubular, and adheres to the ovary; and the corolla, which is also tubular, has six segments arranged in two rows; the inner row, which is supposed to consist of the dilated filaments of abortive stamens, has one of the segments, called the labellum, larger than the rest. There are three stamens, two

of which are abortive, as in the Orchidaceæ ; but the pollen does not cohere in masses, and it is not inclosed in a kind of pouch or bag. The ovary is three-celled (though the cells are sometimes imperfect), and many-seeded ; the style is filiform, and the stigma is dilated and hollow. The fruit is generally a capsule ; but in some cases it is a berry.

ORDER CLXXXV.—CANNEÆ.

THE most interesting genera are—*Canna*, containing reed-like plants with brilliant flowers ; as, for example, *C. indica*, the Indian Shot ; *Thalia*, a curious aquatic ; and *Maranta*, the tubers of which furnish India Arrowroot. The flowers in their construction greatly resemble those of the preceding order ; but the filaments of the stamens are petal-like, and it is one of the side stamens that is perfect, the middle and the other side stamens being always abortive. The fruit is always capsular.

ORDER CLXXXVI.—MUSACEÆ.

THE genus *Musa* is known by its fruit, which is eaten under the names of Plantain and Banana. The flowers are produced in spikes, enclosed in spathe-like bracts, which are often

richly coloured ; and they are succeeded by the fruit, which hang down in massive spikes of enormous weight. The leaves are very large and strong, and Indian muslin is manufactured from the fibres of one of the species. The principal other genera, *Strelitzia* and *Heliconia*, are both remarkable for the brilliant colours of their flowers.

ORDER CLXXXVII.—IRIDACEÆ.

THE principal genera belonging to this order are—Iris, *Moræa*, *Marica*, *Vieusseuxia*, *Homeria*, *Sisyrinchium*, *Patersonia*, *Witsenia*, *Ferraria*, *Tigridia*, *Babiana*, *Watsonia*, *Gladiolus*, *Sparaxis*, *Tritonia*, *Ixia*, and *Crocus* ; but almost every genus contained in the order has showy flowers, and is consequently well known in gardens. The leaves are generally thin, long, and flat, with the edge towards the stem, and the flowers are produced from spathes ; the perianth is also in six segments coloured alike, the calyx and corolla being in most cases confounded together. The genus *Iris* has generally tuberous or solid bulbous roots, of the kind called corms, and the perianth of the flower is divided into six segments, three of which are larger than the others ; these three larger segments, which form

the calyx, (see *a* in *fig. 148*) are reflexed, and a stamen springs from the base of each, which reclines upon it, with its anther turned from the rest of the flower, the segment, in many species, having a kind of crest or beard near the base, as though it were in-



FIG. 148.—FLOWER OF THE IRIS.

tended to form a cushion for the stamen to repose on, while over each stamen is spread, as a kind of coverlid, a stigma (*b*) which is dilated so as to resemble a petal. The petals (*c*) often stand erect, and were called by Linnæus the standards. The seed-vessel, which forms below the flower, is a three-celled capsule, opening, when ripe, by three valves, and containing numerous seeds.

The other genera differ from the *Iris* in having the lower part of the segments of the perianth generally combined into a tube, with the ovary below, looking like a footstalk; the limb being divided into six parts, all so much alike, both in form and position, as to render it difficult to

distinguish the calyx from the corolla. There is only one style, with three stigmas, which are always more or less leafy, and the anthers (which are never more than three) are always turned away from the pistil. In *Ferraria*, the filaments of the stamens grow together, and form a hollow tube, as in the *Passion-flower*, surrounding the style and stigmas; and in the *Saffron Crocus* (*C. sativa*), the stigmas (which, when dried, form the saffron) are so heavy, as to hang out on one side of the perianth from between the segments. Most of the genera have solid bulbs or corms at the base of their stems; but some, such as *Marica*, *Sisyrinchium*, and *Patersonia*, have only fibrous roots. The genera *Colchicum* and *Bulbocodium* very much resemble the *Crocus* in the appearance of their flowers; but they are distinguished by having three styles and a superior ovary, and they are included in the order *Melanthaceæ*.

ORDER CLXXXVIII.—HÆMODORACEÆ.

THE principal genera are *Wachendorfia*, *Hæmadorum*, and *Anigozanthos*, which differ from the preceding genus principally in having six stamens, the anthers of which are turned towards the stigma. Most of the genera have only fibrous roots, but *Wachendorfia* has a rhizoma, producing buds in the scales. The

plants are natives of the Cape of Good Hope and New Holland, and the roots of some of the species yield a brilliant scarlet dye.

ORDER CLXXXIX.—HYPOXIDÆÆ.

BULBOUS-ROOTED plants, with long narrow leaves covered with soft downy hairs, and rather small yellow flowers, which are frequently fragrant.

ORDER CXC.—AMARYLLIDACEÆ.

A LARGE order of genera, all of which have bulbous roots, and most of them splendid flowers. Some of the most interesting genera are—*Amaryllis*, *Nerine* (the Guernsey Lily), *Brunsvigia*, *Hæmanthus*, *Crinum*, *Pancratium*, *Narcissus*, *Galanthus* (the Snowdrop), *Leucojum*, *Alstroemeria*, and *Doryanthes*. The different kinds of *Amaryllis* have large lily-like flowers, divided into six equal segments, which are joined into a tube below, with six stamens, the anthers of which are turned towards the pistil, and a long style crowned with a simple stigma. The ovary is beneath the other parts of the flower, to which it serves as a receptacle; and in most of the plants it looks like a small green calyx below the perianth. The leaves are very long, but they are rather thick

and fleshy, and their edge is not turned towards the stem. In *Narcissus*, *Pancratium*, and some other genera, the flowers have a kind of cup within the perianth, formed of the filaments of abortive stamens grown together. In *Pancratium*, the filaments of the anther-bearing stamens grow into the others, so as to form a part of the cup, the anthers springing from the margin of it; but in *Narcissus*, the fertile stamens are distinct. In *Galanthus*, and its allied genera, the anthers open by pores, as in the *Ericaceæ*, and there is a kind of receptacle on the germen, in which the petals, and sepals, and the filaments of the stamens, are inserted.

ORDER CXCI.—HEMEROCALLIDÆ.

THIS order, which included the Day Lilies (*Hemerocallis* and *Funkia*), the African Lily (*Agapanthus*), the Aloe (*Aloë*), the Tuberose (*Polianthes*), with several other genera which have their flowers in upright racemes or umbels, is now generally considered to form a section of the order *Liliaceæ*.

ORDER CXCI.—DIOSCOREÆ.

THE Yam (*Dioscoreæ*), and the Elephant's-foot (*Testudinaria*), are the principal genera in

this order ; and both have an enormously-large tuberous root which is eatable, and a very slender climbing stem, with rather small leaves and inconspicuous flowers. The ovary is below the flower, and the fruit is capsular.

ORDER CXCHL.—TAMACEÆ.

THIS order consists only of the genus *Tamus*, the Black Bryony, which Dr. Lindley includes in Dioscoreæ. It has, however, a berry-like fruit.

ORDER CXCIV.—SMILACEÆ.

THIS order includes *Smilax*, the root of a species of which affords the drug called Sarsaparilla, the Lily of the Valley (*Convallaria*), and the Alexandrian Laurel, or Butcher's Broom (*Ruscus*). The male and female flowers in *Smilax* are on different plants ; and in *Ruscus* the flowers spring from the middle of the leaves. The perianth is in six equal segments, and there are six stamens. The ovary is three-celled, with the cells one or many seeded, and the fruit is a globose berry. The seeds, when ripe, have a brown membranous skin. Dr. Lindley confines this tribe to *Smilax*, and *Ripogonum* ; and includes the other genera in Liliaceæ.

ORDER CXCV.—ASPHODELEÆ.

THIS order includes the Hyacinth (*Hyacinthus*), the squills (*Scilla*), the onions (*Allium*), the Grape Hyacinth (*Muscari*), the Star of Bethlehem (*Ornithogalum*), King's Spear (*Asphodelus*), *Anthericum*, *Albuca*, *Gagea*, *Thysanotus*, *Asparagus*, the Dragon-wood (*Dracæna*), and New Zealand flax (*Phormium*). Many of these plants have tunicated bulbs; that is, bulbs which consist of several fleshy tunics or coats, which may easily be separated from each other, as may be seen in the hyacinth and the onion. The leaves are fleshy, and ligulate or strap-shaped; and the stems are frequently hollow. The flowers are generally in upright racemes, or umbels; they are regular, and sometimes bell-shaped; the perianth is divided into six segments, which are sometimes partly united into a tube, and recurved at the tip. There are six stamens attached to the perianth, and the fruit is either a fleshy or dry three-celled capsule, generally with several seeds, and opening into three valves, when ripe. Dr. Lindley makes this a separate order in his *Ladies' Botany*, but he combines it with Liliaceæ in his *Introduction to the Nat. Syst.*, and Sir W. J. Hooker includes in it *Yucca* and *Aloe*, the first of which in the *Hortus Britannicus* is included in Tulipaceæ, and the latter in Hemerocallideæ.

ORDER CXCVI.—TULIPACEÆ.

THIS order in the *Hortus Britannicus* comprises the genera *Yucca*, *Tulipa*, *Fritillaria*, *Cyclobothra*, *Calochortus*, *Lilium*, *Gloriosa*, and *Erythronium* (the Dog Violet); but Sir W. J. Hooker omits *Yucca*, and adds *Blandfordia*, *Hemerocallis*, and *Polianthes*; while Dr. Lindley includes all these plants, together with those comprised in *Asphodeleæ*, in the order *Liliaceæ*. This last appears the most natural arrangement, as all these plants have a regular perianth of six segments, with six stamens, and a dry or fleshy capsule of three cells, opening by as many valves. Some of the genera have more seeds than others, and some of the seeds have a hard, dry, black skin, while others have the skin spongy and soft. Some of the genera have the flowers erect and single, as in the Tulip; in others the flowers are erect, but in umbels, as in the Orange Lily; and in others they are in racemes and drooping, as in the *Yucca*, or single and drooping, as in the *Fritillaria*, or with the segments curved back as in the Martagon Lily.

ORDER CXCVII.—MELANTHACEÆ.

THE plants belonging to this order have generally inconspicuous flowers, except *Colchicum* and *Bulbocodium*, both of which have flowers like the *Crocus*. The bulbs of the *Colchicum* are used in medicine; but they and the whole plant abound in an acrid juice, which is poisonous if taken in too large a dose. The root of *Veratrum* is also poisonous, and this plant is believed to be the Hellebore of the ancients. The *Colchicum* and the *Bulbocodium* are distinguished from the *Crocus* genus, which they so strongly resemble in the appearance of their flowers, by the ovary being within the flower instead of below it, as is the case with all the *Amaryllidaceæ*, and by their having three distinct styles, instead of one style and three stigmas. In all other respects they are the same.

ORDER CXCVIII.—BROMELIACEÆ.

THIS order includes the Pine Apple (*Bromelia Ananas*), the American Aloe (*Agave americana*), *Billbergia*, the magnificent plant *Bonapartea juncea*, now called *Lyttæa geminiflora*, and the curious epiphyte *Tillandsia*. What we are accustomed to call the fruit of the Pine

Apple is, in fact, a fleshy receptacle, like that of the Strawberry, covered with scaly bracts, which are the remains of the fallen flowers. The flowers are blue, and one is produced in each bract; when they fall, the bracts thicken and grow together, and cover the ovaries, which sink into the fleshy part of the receptacle.

ORDER CXCIX.—PONTEDERACEÆ.

ELEGANT aquatic plants, with kidney-shaped leaves, and spikes or racemes of blue or white flowers. The principal genus is *Pontederia*.

ORDER CC.—COMMELINEÆ.

THIS order is principally known in Britain by the Spiderwort (*Tradescantia*), and the beautiful *Commelina cælestis*. Both plants have the flowers springing from a tuft of leaves which sheath the stem.

ORDER CCI.—PALMÆ.—THE PALM TRIBE.

THIS order contains many lofty trees, which are, with one exception, without branches, and bear a tuft of large leaves, called fronds, at the summit. The flowers are small, with bracts, and they are enclosed in a spathe,

which bursts on the under side. The mass of flowers is called a spadix; and it is succeeded by the fruit, which, when ripe, is either a drupe or a berry. In the Cocoa-nut Palm (*Cocos nucifera*) the fruit is a drupe; but the pericardium consists of hard, dry, fibrous matter, which is uneatable, the only part fit for food being the albumen of the kernel. The Date Palm (*Phœnix dactylifera*), and the Sago Palm (*Sagus Rumphii*), are two interesting plants, from their products.

ORDER CCII.—PANDANEÆ.

THE most interesting plant in this order is the Screw Pine (*Pandanus*), which has the habit of the Palms, but the flowers of the Arum tribe.

ORDER CCIII.—TYPHINEÆ.—THE BULLRUSH
TRIBE.

THE Bullrushes (*Typha*), also called Cat's-tail and Reed-mare, are tall rush-like plants, with a cylindrical mass of dark brown flowers round the stem, surmounted by a spike of yellow flowers. The lower dark-brown flowers are female ones, and the yellow ones are the males; the former consist only of an ovary on a long stalk, and a calyx cut into fine hairs so as to form a kind of pappus. The male flowers have a

chaff-like calyx, enclosing the stamens, the filaments of which are united at the base, and the anthers are very long and of a bright yellow. The seed is a dry capsule, and the plant has a rhizoma or creeping stem under the water.

ORDER CCIV.—AROIDEÆ.—THE ARUM TRIBE.

THESE curious plants have their flowers in a spadix, enclosed in a spathe, the male and female flowers being separate, and the former above the latter, with some abortive ovaries again above them. The male flowers have only one stamen in each without any covering; and the female flowers in like manner consist each of a single ovary, with a puckered-up hole in the upper part, which serves as the stigma. The fruit consists of a cluster of red berries, which form round the spadix. Many of these plants have a very unpleasant smell, and some of them have a tuberous root, which, when cooked, is eaten, though it is poisonous when raw. *Arum* or *Caladium esculentum* is thus eaten as a common article of food in the East Indies; but the Dumb Cane (*A.* or *C. sequinum*) has its English name from its juice being so poisonous as, if tasted, to cause the lips to swell so as to prevent the possibility of speaking. The beautiful marsh plant called *Calla* or *Richardia ethio-*

pica, or the White Arum, belongs to this order ; as does the fragrant rush, *Acorus Calamus*. The order Typhaceæ is included by many botanists in Aroideæ ; and indeed, the difference between them consists principally in the Bullrushes having no spathe.

ORDER CCV.—FLUVIALES, OR NAIADES.—THE
POND-WEED TRIBE.

FLOATING plants, of which *Aponogeton distachyon* is by far the most beautiful. This plant, which is a native of the Cape of Good Hope, has oblong, deeply-ribbed leaves on very long footstalks, and the flowers in two-cleft spikes, with snow-white bracts, which are very ornamental and very fragrant ; each flower consists of from six to twelve stamens, and from two to five carpels. The root is tuberous, and eatable when roasted. The Duckweed (*Lemna*), which is sometimes included in this order, appears to consist entirely of a few leaves floating on the water, each of which sends down a root ; and many people believe that it never flowers. If, however, it be watched in the months of June and July, two yellow anthers will be seen peeping out of the side of each leaf ; and if the opening be enlarged, the flower will be found to consist of a kind of bag, open on one side, and containing two stamens, with an ovary furnished

with a style and simple stigma. The fruit is a one-celled capsule, containing one or more seeds. Some botanists place this plant in a separate order, called Pistiaceæ, from another genus included in it.

ORDER CCVI.—JUNCEÆ.—THE RUSH TRIBE.

THE most interesting genus is the Rush (*Juncus*). These plants, low as they rank in the vegetable world, have a regular perianth of six divisions with six stamens, and a three-celled capsule which opens by three valves. The perianth of the flowers is, however, so small as to be inconspicuous. Most of the species are weeds, which are considered to indicate cold, wet, and poor ground.

ORDER CCVII.—GILLESIEÆ.

A GRASS-LIKE plant, a native of Chili, with greenish flowers.

ORDER CCVIII.—RESTIACEÆ.—THE PIPEWORT TRIBE.

RIGID, inelegant, and often leafless, plants, with the habit of rushes, natives of New Holland and the Cape of Good Hope.

§ II.—GLUMACÆ.

These plants, instead of having a regular calyx and corolla, have nothing but green and brown scales, which are called glumes, to cover the stamens and pistil. There are only two orders belonging to this division in British fields and gardens.

ORDER CCIX.—CYPERACEÆ.—THE SEDGE TRIBE.

THESE plants have solid stems, and the leaves not only sheathe the stem, but grow together round it, so as to form a kind of tube. The flowers are arranged in heads, some of which contain only male flowers, each of which consists of a membranous scale and three stamens, and others contain only female flowers. In the genus *Carex*, the Sedge, these flowers are each enclosed in a kind of bottle formed by two scales growing together, and opening at the top into two parts so as to show three stigmas, which have only a single style. The fruit is a dry, hard, triangular capsule with only one seed. The most remarkable genera are *Papyrus*, the plant anciently used for paper; *Scirpus*, the Club-rush, used for making the seats of chairs, mats, &c.; *Eriophorum*, Cotton-grass; and *Cyperus*.

ORDER CCX.—GRAMINEÆ.—THE GRASS TRIBE.

THIS very important order includes not only the common Grasses, but the Bread Corns, or Cereal Grasses—Wheat, Oats, Barley, Rye, and Maize; and the Sugar-cane and Rice. All these plants are botanically allied to the Sedges, but their stems are hollow, except at the joints, where they become solid; and their leaves, though sheathing the stem, do not unite round it. The flowers are produced in spikes, which are what are called spikelets. The glume, or calyx as it was called by Linnæus, is generally two-valved; and within it are two thinner smaller scales, or paleæ, which were called the corolla by Linnæus. Besides these, there are frequently two still smaller scales within the paleæ. There are generally three or six stamens, the anthers of which are two-celled, and forked at the extremity. There are two styles, either quite distinct, or combined at the base, and the stigmas are feathery. The pericarp is membranaceous, and adheres to the seed, forming a kind of caryopsides. The seeds contain a great deal of albumen, which, when ground into flour, becomes nourishing food. The stems, or culms, are hollow and articulated; the leaves, which are alternate, springing from each joint. The most important genera are Wheat (*Tri-*

ticum), Barley (*Hordeum*), Rye (*Secale*), Oats (*Avena*), Maize (*Zea*), the Sugar-cane (*Saccharum*), Rice (*Oryza*), and the Bamboo (*Bambusa*). Oats are not produced in spikes, but in loose panicles; and the male and female flowers of the Maize or Indian Corn are on different plants.

CHAPTER IV.

CRYPTOGAMOUS PLANTS.

THESE plants are generally described as being without spiral vessels, and consisting only of cellular tissue ; but spiral vessels are known to exist in the Ferns, and are said to have been found in the Mosses. Whether this be the case or not, it is evident that the plants included in this division are very different from all that have preceded them, and occupy a lower grade in the scale of vegetable creation. They are divided into two sub-classes : viz. the *Foliaceæ*, or those with leaves, and the *Aphyllæ*, or those without leaves ; both of which are without visible flowers, though some have what are called anthers, and the Mosses have something resembling a style and stigma. They may also be said to have no seeds, for the spores, or sporules as they are called, are very different from the seeds of vascular plants, and they have neither cotyledon nor embryo.

SUB-CLASS 1. FOLIACEÆ.

ORDER CCXL.—FILICES.—THE FERN TRIBE.

THOUGH some of the Ferns are so common that almost every one must have seen them, very few persons are aware how very curiously they are constructed. In the first place, they may be said to have neither stems nor leaves, and neither flowers nor seeds. The different parts of the plant spring from a rhizoma, and the leaves, which are called fronds, have their veins neither branched nor in parallel lines, but forked. On the back of the leaves are some curious brown spots of various shapes called sori; and these, which generally form under the outer skin or cuticle of the leaf, and which always spring from one of the veins, contain a number of small grains, called the thecæ, which are in reality cases containing the sporules or seeds. When the sorus forms under the cuticle of the leaf, the membranous part raised, which resembles a blister, is called the indusium; but sometimes the sori are naked, that is, they are formed on the outside of the cuticle; and sometimes they are found on the margin of the leaf, which folds over them, and supplies the place of the indusium. The order is generally divided into two sections, called Polypodiaceæ and Osmundaceæ. The first contains those plants

which unroll their leaves, when they rise from the stem, and which have their sori either on the back or on the margin of the frond. The thecæ are on stalks, and they are furnished with a ribbed, elastic, articulated but incomplete ring, which seems to serve as a sort of hinge when they burst. This elastic ring is a continuation of the stalk of the theca, which always bursts on the opposite side. The following are the principal genera in this division: Polypody (*Polypodium*), sori without any indusium; Shield Fern (*Aspidium*), Bladder Fern (*Cistopteris*), and Spleenwort (*Asplenium*), all of which have their fronds pinnate or pinnatifid; Maiden Hair (*Adiantum*), Hart's-tongue (*Scolopendrium*), the frond of which is simple and shaped like a tongue, and the sori oblong; and Brake (*Pteris*), the leaves of which are pinnatifid, with the sori placed round the margin so as to form a continuous line, and the edge of the leaf turned over them. The rhizoma of the Brake is eaten in many countries, and the fronds, when burnt, yield alkali, which is used in making both soap and glass.

The second division Osmundaceæ comprises those Ferns which apparently have flowers; the flowers, however, being merely sori, with the leaves on which they grew shrivelled up round them. The most remarkable of these is the

flowering Fern (*Osmunda regalis*); but others are—the Grape Fern or Moonwort (*Botrychium*), a species of which, a native of North America, is called there the Rattle-snake Fern; and the Adder's Tongue (*Ophiglossum*). The Tree Ferns of New Zealand are magnificent plants. The trunk or stipe rises to the height of forty or fifty feet without a branch, and then terminates in a head of noble fronds, which hang down on every side like a plume of feathers. The wood of these trees when cut across, instead of being in circles like the wood of Dicotyledonous trees, or full of pores like that of the Endogens, is marked with a number of zigzag lines, the traces of the stalks of old fronds which have grown together and formed the stipe.

ORDER CCXII.—LYCOPODINEÆ.—THE CLUB-MOSS
TRIBE.

THESE plants appear to occupy the intermediate space between the Ferns and the Mosses. They have creeping stems, and grow two or three feet high; the erect stems being clothed with imbricated leaves, in the axils of which these are produced. Some of them open into three or four valves, and contain sporules; while others are only two-valved, and contain a kind of powder, which some suppose to be

pollen, and others abortive sporules. In some of the species, the thecæ are produced in bracteated spikes, which resemble the young strobiles on a Spruce Fir. The seeds of the common Club-moss (*Lycopodium clavatum*) are used at the theatres to imitate lightning.

ORDER CCXIII.—MARSILEACEÆ.

THESE are aquatic herbs, the thecæ or receptacles of which are always found in the axils of the leaves near the root. In the genus *Isoetes* (Quillwort) these are of two kinds, like those of the Club-mosses, the one containing powder, and the other granules; but in Pepper-grass or Pill-wort (*Pillularia*), the receptacles are four-celled, and each cell contains both powder and granules. *Marsilea*, from which the order takes its name, is a native of Italy and other parts of the south of Europe, where it grows in the same manner as Duckweed does with us.

ORDER CCXIV.—EQUISETACEÆ.—THE HORSE-TAIL
TRIBE.

THE thecæ of these well-known plants are contained in terminal cone-like spikes or catkins, from four to eight lying in each scale.

The stems are tubular, and articulated with whorls of membranaceous sheaths, and of slender branches, jointed, and sheathed like the stem at every joint. All the species of *Equisetum* abound in silicious matter, and particularly the Dutch Rush (*E. hyemale*), which is used for polishing both wood and metal. The handsomest species is *E. sylvaticum*.

ORDER CCXV.—CHARACEÆ.

AQUATIC herbs, contained in the genera *Nitella* and *Chara*, always growing under water, with slender jointed stems, surrounded at the joints by whorls of tubular leaves or branches, which are either membranaceous and transparent, as in *Nitella* ; or brittle, and more or less encrusted with carbonate of lime, as in *Chara*, Stonewort. The organs of reproduction are formed in the axils of the branches, and consist of transparent globules, and hard, spiral nuculas, which appear to be formed of twisted leaves, the points of which often form a kind of crest. Young plants are only produced by the nuculas.

ORDER CCXVI.—MUSCI.—THE MOSS TRIBE.

THE Mosses have fibrous roots, and slender wiry stems, densely covered with leaves, which are very small, and laid over each other like scales (see *a* in *fig.* 149). The theca (*g*) is urn-

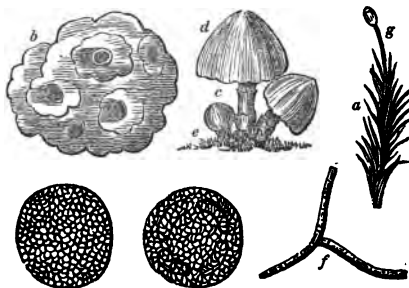


FIG. 149.—CRYPTOGAMOUS PLANTS.

shaped, and it is produced singly ; in most cases, on a long, slender, wiry stem, called a *seta*, which signifies a bristle, but sometimes without any stalk. It always springs from a tuft of leaves, differing both in size and shape from ordinary leaves, which form what is sometimes called the *perichæcium*. Among these may occasionally be seen a few stalks, resembling the Lichen called Cup-moss, which terminates in a kind of cup, and thickened at the base. The cups and upper parts soon die away, and the thicker part left among the leaves swells, and

in time rises on a stalk of its own, carrying away one of the leaves with it on its head. This is the theca, and the leaf it carried away, and which resembles an extinguisher, is called the calyptra, and it remains on till the sporules are nearly ripe. When the calyptra falls, the theca is found to be covered with a little lid called the operculum; which also falls off in time, and shows the mouth or stoma of the theca. This mouth is sometimes naked, and sometimes covered with a kind of film; but generally it is surrounded by a row of long, slender, hair-like teeth called the peristome or fringe. When there are two rows of these hair-like teeth, the inner ones, which are finer than the others, are called the cilia; and the number of both the cilia and the teeth is always some number that can be divided by four. In the cavity of the theca is a central axis called the columella, and around that are found the sporules, kept together by the lining of the theca, which forms a kind of open bag. This is the usual construction of all the numerous genera of mosses; but in some kinds, as for example in the Hair-moss (*Polytrichum*), in addition to the theca, a number of granules are found among the leaves, which are said to be capable of producing young plants.

ORDER CCXVII.—HEPATICÆ.

THESE plants greatly resemble Mosses in their appearance, but they differ in their construction. The theca has no lid, but bursts into valves; and it generally contains not only sporules, but tubes formed of curiously twisted threads, called elaters. *Jungermannia* and *Marchantia* have a calyptra, which the other genera are without; and in *Jungermannia* the theca has a sort of sheath, which is sometimes called the calyx. There are also stalked granules called anthers, and warts which form on the leaves, and break up into a kind of sporules.

SUBCLASS II.—APHYLLEÆ.

ORDER CCXVIII.—LICHENES.

THOUGH these plants are said to have no leaves, they consist almost entirely of a kind of leafy stem, called a frond or thallus, the branches of which are called podetia (see *a* in *figs.* 150, 151, and 152). The spores or sporules are produced in what are called shields (*b* in *figs.* 149, 150, and 151), which are generally embedded in the thallus, and which, when they

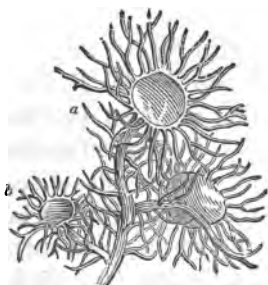


FIG. 150.—*USNEA FLORIDA*.
(Old Trees.)

Some of the commonest lichens are *Usnea florida* (fig. 150), and *Ramalina fastigiata* (fig. 151), both of which are found on old oaks, and are generally called grey moss; and *Cornicularia heteromalla* (fig. 152) is a brown mossy-looking lichen,



FIG. 151.—*RAMALINA FASTIGIATA*.
(Rocks and Trees.)

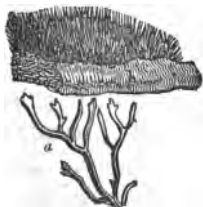


FIG. 152.
CORNICULARIA HETEROMALLA.—(Old Trees.)

are cup-shaped (as in fig. 150), are called scyphæ, and when flat (as in fig. 151), apothecia. The sporules, which are very numerous, are inclosed in receptacles of various forms, which are embedded in the shields.

Other more interesting lichens are—the Iceland-moss (*Cetraria islandica*), the Reindeer-moss (*Cenomyce*, or *Cladonia rangiferina*), the Cup-moss (*Cenomyce pyxidata*), and the Orchil (*Rocella tinctoria*).

ORDER CCXIX.—FUNGI.

THE Fungi are divided into several distinct sections ; the most important of which may be called the Mushroom tribe. The largest genus in this division is *Agaricus*, and the plants belonging to it consist of a stipe, or stalk (*c* in *fig.* 149), surmounted by the pileus or cap (*d*). When the mushroom first appears, the stalk is covered by a thin membrane, called the veil (*e*), which unites the cap to the lower part ; but as the mushroom grows, this veil is rent asunder, and it either entirely disappears, or only a small part of it remains round the stalk, which is called the annulus or ring. Under the cap are the gills or lamellæ, which are of a dark reddish brown ; and attached to these are the thecæ, containing the sporules or seed. In the common Mushroom (*Agaricus campestre*), and all the eatable kinds, the gills are pink when the veil breaks, which it does very soon, and they become afterwards nearly black ; but in all the poisonous kinds, the veil is longer before it breaks, and when it does so, the gills are pale, and frequently nearly white, without becoming darker ; the smell is also quite different. The Mushroom tribe, which includes all the Fungi that carry their sporules in the part above the stem, is divided into two sections, viz.,

those with caps, like the Mushroom, and those which are slender and entire, but club-shaped in the upper part, like *Clavaria helvola*, a fungus often found in meadows, which resembles the stamen of an orange-lily.

The Morel tribe includes those Fungi which have their sporules in the stipe, and it is in two divisions; the first of which includes those which, like the Morel (*Morchella esculenta*), have a pileus, or cap, like a mitre; and the second, those which have the pileus curving upwards, like a cup, as in *Peziza*. A third tribe includes those which, like *Tremella*, are of a jelly-like substance; and in a similar manner all the numerous genera are arranged. Among these the most remarkable are the Truffle (*Tuber cibarium*), which is found buried in the earth, and the curious Fungi called Blight and Mildew, which belong to several different genera, and which appear on the leaves and fruit of other plants.

ORDER CCXX.—ALGÆ.

THE Sea-weeds are placed on the extreme verge of the vegetable kingdom; and indeed some of them seem almost to partake of the nature of zoophytes. They can live only where there is abundance of moisture, and many of

them, such as the different kinds of *Fucus*, inhabit the sea; by the waves of which they are torn up from their native beds, and washed on shore by the tides. Others are found in the form of *Confervæ*, or green slime, on the surface of stagnant ponds, or on damp stone or gravel-walks; and others appear to form one of the connecting links between vegetable and animal life, as the joints in which they are produced possess the power of separating from each other, and in their divided state so closely resemble animals, as to puzzle naturalists to know where to place them. The Algæ are divided by botanists into three classes; viz., the jointless, the jointed, and the disjointed. The jointless Algæ are by far the most numerous; and they comprehend all those broad flat jelly-like substances which are called by the popular names of tangle and dulse on the coast, and which are frequently eaten. To this division belong the kinds of sea-weed that are used for making kelp; those from which iodine is procured; those forming the celebrated Chinese birds' nests; those sold in the oil-shops under the name of laver; and those used by farmers as manure. The jointed Algæ are very inferior in the scale of creation to the first division; but the *Confervæ* (see *f* in *fig.* 149) are well known, from the rapidity with which

they form a thick green slime, by adhering together on the surface of ditches and cisterns, and in short, wherever there is stagnant water exposed to the open air. The disjointed Algæ are generally found among the Confervæ; but they are so small, and insignificant in appearance, as, in most cases, entirely to escape notice.

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